

Sky & Telescope's
**POCKET
SKY ATLAS**



Sky & Telescope's Pocket Sky Atlas

Roger W. Sinnott

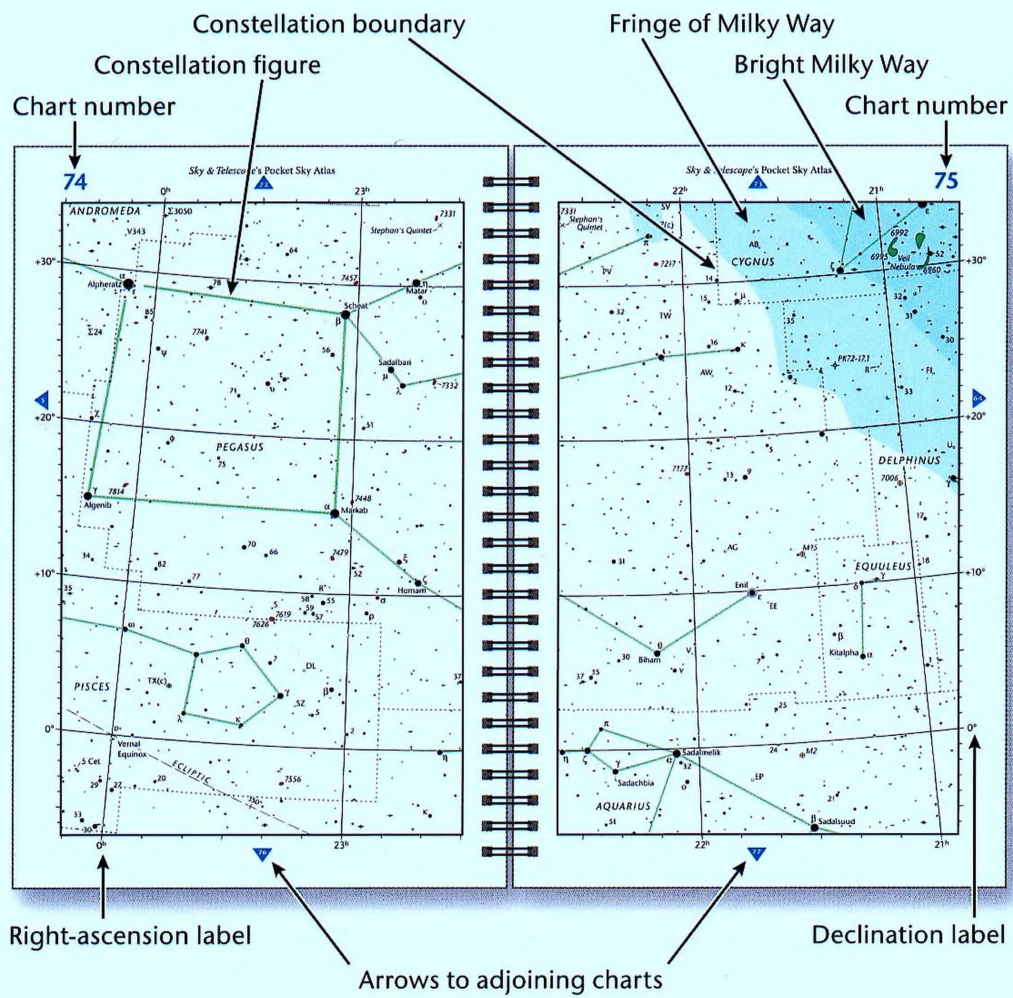
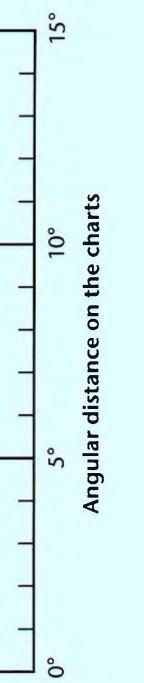
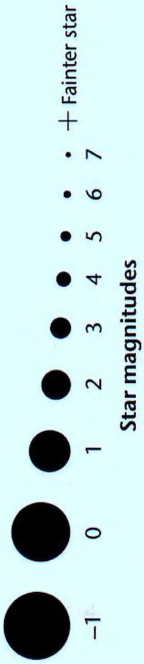
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Roger W. Sinnott



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Roger W. Sinnott

Sky Publishing Corporation
Cambridge, Massachusetts, USA

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Introduction

Think of this as your *working* sky atlas, the one you carry out to your backyard telescope or pack in luggage for a trip far from home. Today, amateur astronomers have abundant choices in the celestial charts they use. Some come in elegant multi-volume sets, a few have large sheets that unfold, and others run on a computer. But did you ever see a booklet of star maps so handy to use at the telescope?

The editors of *Sky & Telescope* magazine don't just write. Like amateurs everywhere, we go out at night to observe stars, planets, the occasional comet, and a profusion of deep-sky sights. In a half century we've published six major astronomical atlases, but this — our seventh — is the only one designed and prepared entirely in-house. We've paid close attention to features our readers have begged for in an atlas over the years.

Above all, we wanted this *Pocket Sky Atlas* to be convenient for use in the field at night. Charts on facing pages form a spread that spans 50° of sky, but you can also fold the book back on its spiral binding and hold it in one hand. For recognizing star patterns quickly, we've added "stick figures" for constellations — the same ones we've used in *S&T* since 1993. These green lines should help you find your way better than the official constellation boundaries (finely dotted lines).

The Milky Way is portrayed by a simple two-tone scheme in which a darker shade of blue marks the brighter core. These contours are adapted from the first (1981) edition of Wil Tirion's *Sky Atlas 2000.0*.

What the Atlas Shows

The 80 main charts contain 30,796 stars to visual magnitude 7.6, roughly five times as many as you can normally see with the naked eye. Because all these stars are readily visible in a low-power finderscope, they make helpful benchmarks and patterns for "star-hopping" to any object of interest.

Double and multiple stars are marked with a horizontal bar. For the purposes of this atlas, stars are considered double if they have a companion brighter than magnitude 10.5 that is resolvable in amateur telescopes within $30''$ of the primary star, or a companion brighter than 8.5 within $200''$.

Variable stars are shown with an outer ring to represent the star's brightness at maximum, and an inner dot to show the star's brightness at minimum (if that minimum is magnitude 7.6 or brighter). Only those stars that vary more than 0.5 magnitude are identified as variables here.

The selection criteria for nonstellar objects depend on the type. Virtually all the galaxies plotted are brighter than visual magnitude 11.5 and globular

clusters brighter than 10.5. Planetary nebulae, whose light is typically more concentrated and hence easier to see, are included if brighter than about 12. The light of an open star cluster tends to be spread over a generous patch of sky. Nearly every cluster we've included has an overall brightness exceeding that of an 8th-magnitude star, but a few dozen fainter clusters are included because they are rich or compact and just as easy to see.

The outlines of most bright nebulae, supernova remnants, and dark nebulae have been adapted and simplified from those drafted by E. Talmadge Mentall for the *Millennium Star Atlas*. Some of these objects, like the magnificent Simeis 147 at the Taurus-Auriga border, are difficult or impossible to see visually but rewarding to capture photographically.

We decided to include all objects in the Astronomical League's popular Herschel 400 observing list, even though a few of them would have been rejected by the selection criteria outlined above. For a special observing treat, try hunting down some of the 55 carbon stars identified by "(c)" in the atlas. Their vivid red hue can be quite striking in a large amateur telescope.

For more information about deep-sky objects of all kinds, and astronomy in general, consult the books and links in the Bibliography on page xi.

Understanding Labels

Many bright stars have a traditional name like Betelgeuse or Albireo. A larger number carry a Greek letter assigned by German cartographer Johann Bayer in 1603, or perhaps a roman letter (especially in the southern sky). For important stars not identified this way, we use the number

applied by English astronomer John Flamsteed early in the 18th century (though many Flamsteed numbers for stars fainter than magnitude 5.5 are omitted to avoid clutter). Some special-interest objects have an astronomer's name and number attached, such as the fast-moving stars Groombridge 1830 and Lalande 21185.

Variable stars are marked with an upper-case letter (R through Z), two letters (such as UV or AD), or V followed by a number. The best-known double stars have their own special nomenclature, in which the prefix indicates the discoverer. The most common of these are Σ , for Wilhelm Struve; $O\Sigma$, Otto Struve; h, John Herschel; Δ , James Dunlop; and β , S. W. Burnham.

Throughout the atlas, *nonstellar* objects are labeled in *italics*. Most nonstellar objects are known by more than one designation, but just one is given in this atlas. The 109 objects in Charles Messier's famous deep-sky list have the prefix M, and this designation takes precedence over all others. Otherwise, by far the most common numbers are those from J. L. E. Dreyer's *New General Catalogue* (NGC) of 1888 or *Index Catalogue* (IC) of 1895 and 1908. We omit the prefix NGC throughout.

When an object has no M, NGC, or IC number, some other designation is given. For open star clusters, a frequent prefix is Cr (Collinder), Tr (Trumpler), or Mel (Melotte). Many bright nebulae have the prefix Ced (Cederblad), vdB (van den Bergh), or Sh2 (Sharpless). Dark nebulae often have an LDN (Lynds) or B (Barnard) number. In the case of planetary nebulae, PK means Perek-Kohoutek. While numbers from Patrick Moore's popular Caldwell catalog do not appear

in the atlas itself, their equivalent designations and chart numbers can be found in the special index on page xxiii.

Chart Arrangement

A novel feature of the atlas is its layout, illustrated on the inside back cover. Imagine the sky divided into eight gores, or lunes, running from the north celestial pole to the south. Each gore makes up a section of this book and covers a wide swath of sky passing directly overhead at a specific season of the year and time of night — as summarized on the Contents page and on the first page of that section. Therefore, the charts you'll find most useful on a given night tend to be close together in the atlas.

Within each section, chart numbers increase from north to south. From section to section, they increase from west to east. There are 10 charts per section. Notice that each north-circumpolar chart has a number ending in 1, and each south-circumpolar chart has a number ending in 0. Any chart that ends in 4, 5, 6, or 7 contains part of the celestial equator. Each chart has blue arrows in the margins, telling you the chart numbers of immediately adjacent regions.

All charts include some of the sky shown on adjoining charts, and between sections this overlap is especially generous in the polar regions. If an object lies near the outer margin on one chart, chances are excellent it will be well inside the margin on some other chart. Check the General Index on page xiii to find all the charts on which a named object appears.

Notice that the Big Dipper (Chart 32), Gemini (Chart 25), and the Great Square of Pegasus (Chart 74) are shown in their entirety. When you see how many other

much-loved regions of the sky are just as well shown, you might wonder, "How could they be so lucky?" That's another secret of our chart layout! Rather than slice up the sky according to a rigid, mathematical plan, as in other atlases, we freely shifted the centers of individual charts a bit if it would help to keep important star patterns whole (while maintaining sufficient overlap between charts).

Some popular but very congested regions of the sky are shown in more detail on four close-up charts following Chart 80. These are the Pleiades, Orion's Sword, the center of what has been called the Realm of Galaxies in Virgo, and the Large Magellanic Cloud.

How This Atlas Came to Be

In the spring of 2000, fresh back at *S&T* from the Texas Star Party, Gary Seronik got the ball rolling by proposing a small-format version of Sky Publishing's best-selling *Sky Atlas 2000.0*. Within a few months he had generated test plots and convinced himself that, despite early doubts, we wouldn't have to give up a lot of faint stars and deep-sky objects, nor carve up the sky into chunks so small that the atlas would lose its usefulness in the field.

Independently, Joshua Roth was showing other editors his "dissected" copy of *Sky Atlas 2000.0*. As we kicked ideas around, I recalled my earliest days on the staff and a half-serious comment by then-editor Joseph Ashbrook. Referring to a popular book-format atlas of the time, he said it would benefit greatly by having its numerous pages of printed tables and reference material excised, leaving just the handy set of charts!

Soon Richard Tresch Fienberg, Tony

Flanders, and Alan M. MacRobert — experienced observers all — joined our brainstorming sessions. Sky Publishing's Books & Products team of Paul Deans, Benjamin F. Jackson, and Kerri A. Williams launched the project in earnest with the enthusiastic support of president/publisher Susan B. Lit.

I went to work tailoring the magazine's star-charting software to the needs of this project and refining the selection criteria for stars and deep-sky objects. As soon as I could generate the actual computer plots, Gregg Dinderman brought cartographer Martin Gamache of Alpine Mapping Guild in on the project,

and together they crafted the beautifully finished charts you see here. With valued input from Sandra Salamon, Gregg also designed the book, inside and out. Derek W. Corson, Sally MacGillivray, and Dominic Taormina handled countless administrative and production details and coordinated the printing by DS Graphics of Lowell, Massachusetts.

If you have any kind of telescope, you *must* have a first-rate sky atlas or you will never get very far in astronomy. Other fine atlases exist, but we think this one may come closest to meeting your night-by-night needs.

Roger W. Sinnott

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- Tirion, W., and R. W. Sinnott, *Sky Atlas 2000.0*, 2nd edition, Cambridge, MA, 1998: Sky Publishing Corp. and Cambridge University Press.

Helpful Links

- Astronomical League, *The Herschel 400 Club Observing List*, astroleague.org/al/obsclubs/herschel/hers400.html
- Mason, B. D., G. L. Wyckoff, and W. I. Hartkopf, *Washington Double Star Catalog*, ad.usno.navy.mil/wds/wds.html
- Night Sky* magazine, NightSkyMag.com
- Sky & Telescope* magazine, SkyandTelescope.com

Guide to Constellations

After each constellation's name is its standard three-letter abbreviation (in parentheses). This is followed by the

chart(s) on which the constellation, or at least an important part of it, is shown.

Note that Serpens has two sections.

Andromeda (And), 3, 72	Cygnus (Cyg), 62, 73	Orion (Ori), 14, 16, B
Antlia (Ant), 37, 38, 39	Delphinus (Del), 64	Pavo (Pav), 70
Apus (Aps), 40, 50, 60, 70	Dorado (Dor), 18, 20, D	Pegasus (Peg), 74, 75
Aquarius (Aqr), 75, 76	Draco (Dra), 41, 42, 51, 52, 61	Perseus (Per), 2, 13
Aquila (Aql), 64, 65, 66	Equuleus (Equ), 75	Phoenix (Phe), 9, 78
Ara (Ara), 58, 60, 69	Eridanus (Eri), 6, 16, 17, 19	Pictor (Pic), 18, 29
Aries (Ari), 4	Fornax (For), 6, 8, 17, 19	Pisces (Psc), 5, 74
Auriga (Aur), 12	Gemini (Gem), 23, 25	Piscis Austrinus (PsA), 76, 77, 79
Bootes (Boo), 42, 44, 53, 55	Grus (Gru), 78, 79	Puppis (Pup), 26, 27, 28, 29
Caelum (Cae), 18	Hercules (Her), 52, 54	Pyxis (Pyx), 26, 28, 39
Camelopardalis (Cam), 11, 21, 31	Horologium (Hor), 8, 19	Reticulum (Ret), 19, 20
Cancer (Cnc), 24	Hydra (Hya), 24, 26, 36, 37, 39, 46, 47	Sagitta (Sge), 64
Canes Venatici (CVn), 32, 43	Hydrus (Hyi), 10, 20	Sagittarius (Sgr), 66, 67, 68, 69
Canis Major (CMa), 27	Indus (Ind), 68, 79, 80	Scorpius (Sco), 56, 58
Canis Minor (CMi), 25	Lacerta (Lac), 72, 73	Sculptor (Scl), 7, 9, 78
Capricornus (Cap), 66, 68, 77	Leo (Leo), 34, 35	Scutum (Sct), 67
Carina (Car), 28, 30, 39, 40	Leo Minor (LMi), 33, 35	Serpens Caput (Ser), 55
Cassiopeia (Cas), 1, 3, 72	Lepus (Lep), 16	Serpens Cauda (Ser), 65, 67
Centaurus (Cen), 48, 59	Libra (Lib), 46, 57	Sextans (Sex), 36, 37
Cepheus (Cep), 71, 73	Lupus (Lup), 48, 59	Taurus (Tau), 14, 15, A
Cetus (Cet), 6, 7	Lynx (Lyn), 22, 23	Telescopium (Tel), 68, 69
Chamaeleon (Cha), 30, 40, 50, 60	Lyra (Lyr), 63	Triangulum (Tri), 2, 4
Circinus (Cir), 48, 50, 59, 60	Mensa (Men), 20, 30, D	Triangulum Australe (TrA), 60
Columba (Col), 18, 29	Microscopium (Mic), 68, 79	Tucana (Tuc), 10, 80
Coma Berenices (Com), 43, 45, C	Monoceros (Mon), 25, 27	Ursa Major (UMa), 31, 32, 33, 43
Corona Australis (CrA), 69	Musca (Mus), 40, 50	Ursa Minor (UMi), 41, 51
Corona Borealis (CrB), 53, 55	Norma (Nor), 58, 59	Vela (Vel), 28, 39
Corvus (Crv), 47	Octans (Oct), 10, 60, 70, 80	Virgo (Vir), 44, 45, 46, 47, C
Crater (Crt), 36	Ophiuchus (Oph), 54, 56	Volans (Vol), 30
Crux (Cru), 38, 49, 50		Vulpecula (Vul), 62, 64

Greek Letters on Charts

By tradition, the bright stars in each constellation are marked with lowercase Greek letters. A constellation's most bril-

liant star is often called α , but there are exceptions. For example, Gemini's brightest star is β and that of Octans is ν .

α Alpha	ϵ Epsilon	ι Iota	ν Nu	ρ Rho	ϕ Phi
β Beta	ζ Zeta	κ Kappa	ξ Xi	σ Sigma	χ Chi
γ Gamma	η Eta	λ Lambda	$\omicron$ Omicron	τ Tau	ψ Psi
δ Delta	θ Theta	μ Mu	π Pi	υ Upsilon	ω Omega

Charts 1–10

Right Ascension 0^h to 3^h

This section is highest in the night sky
around these times:

Evening: November & December

Midnight: October

Morning: August & September

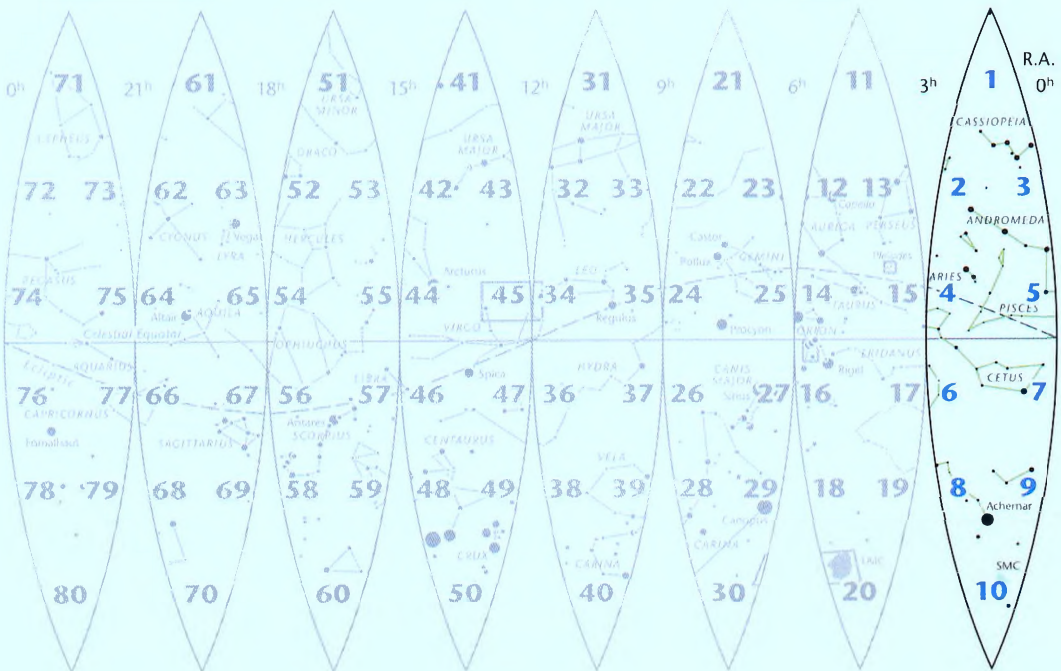


Chart Legend

● Double star

⊙ Variable stars

× Special object

+ Reference point

Open star clusters

50' (to scale) <20'

Globular clusters

50' (to scale) <20'

Galaxies

100' x 20' (to scale)

40' x 30' (to scale)

<20'

Bright nebulae

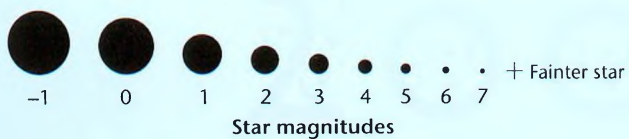
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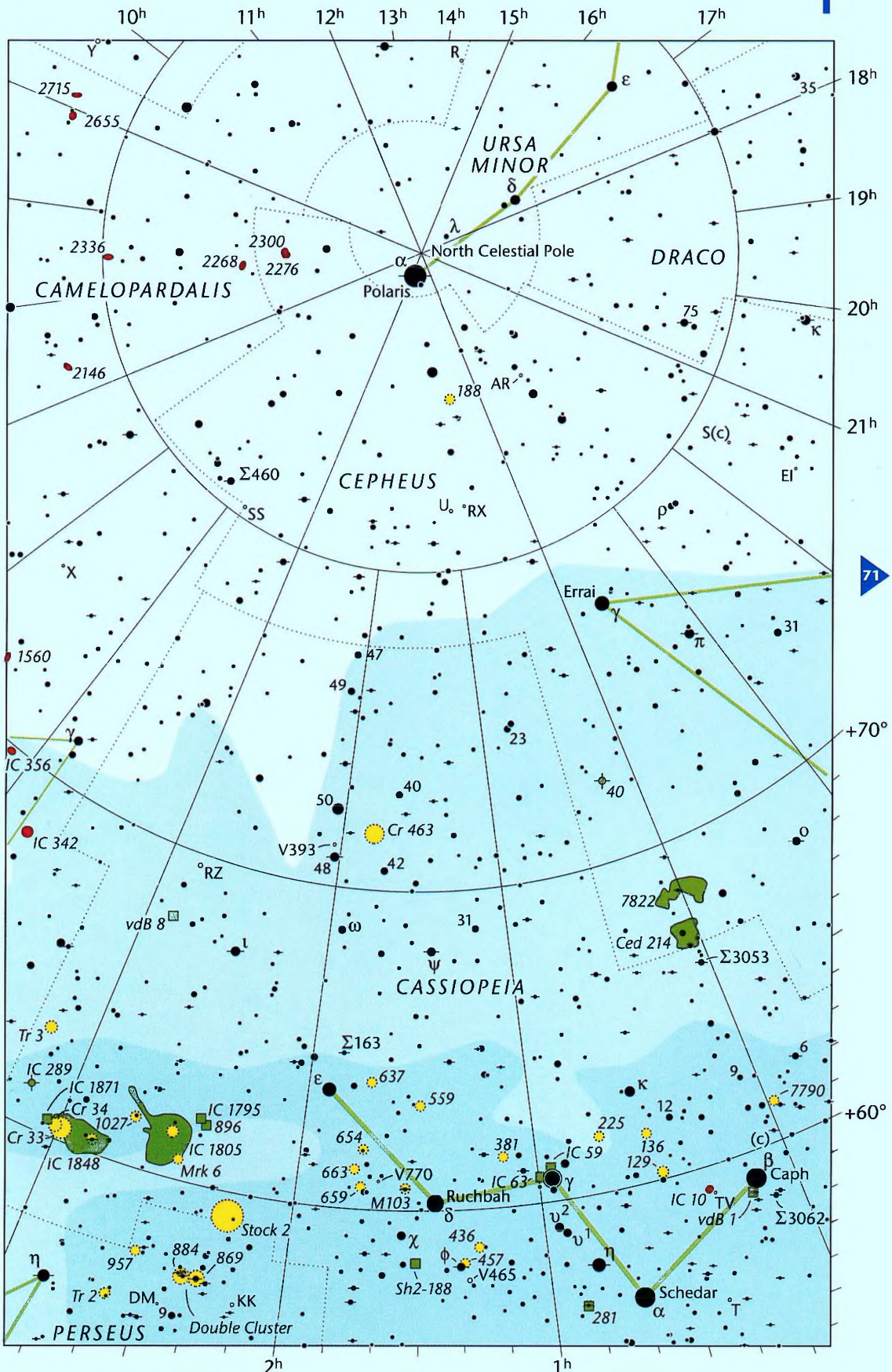
Dark nebulae

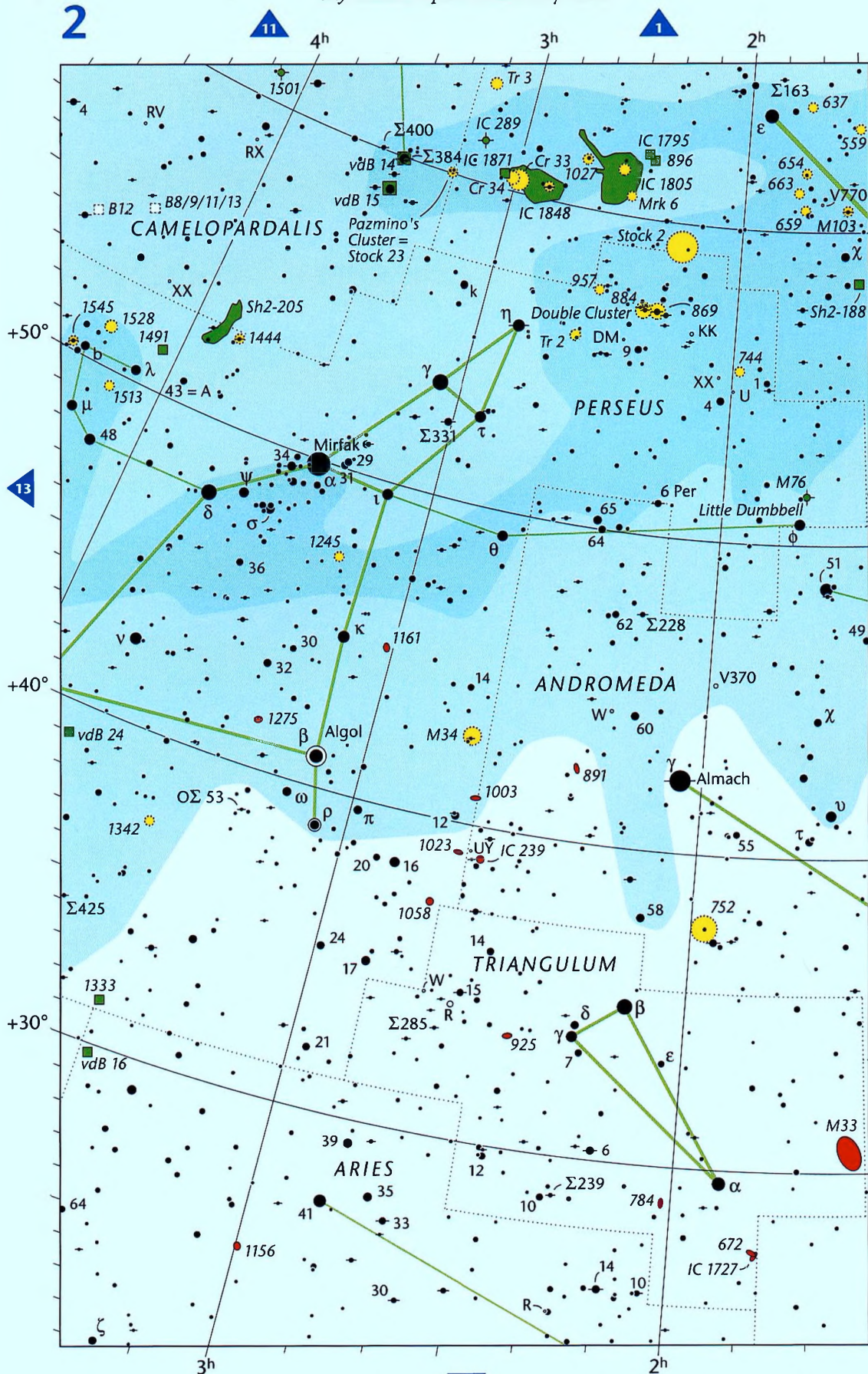
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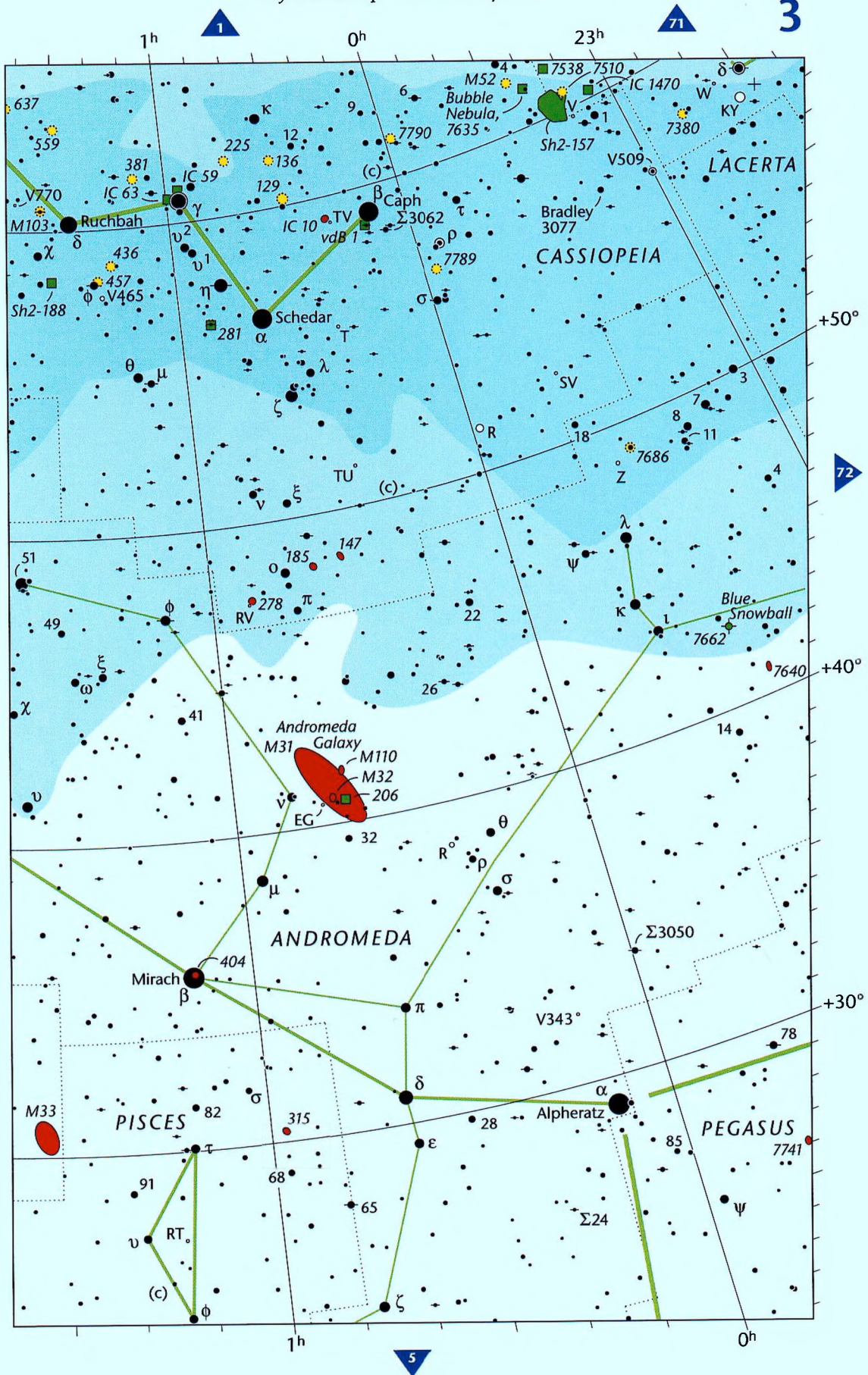
Planetary nebulae

50' (to scale) <20'

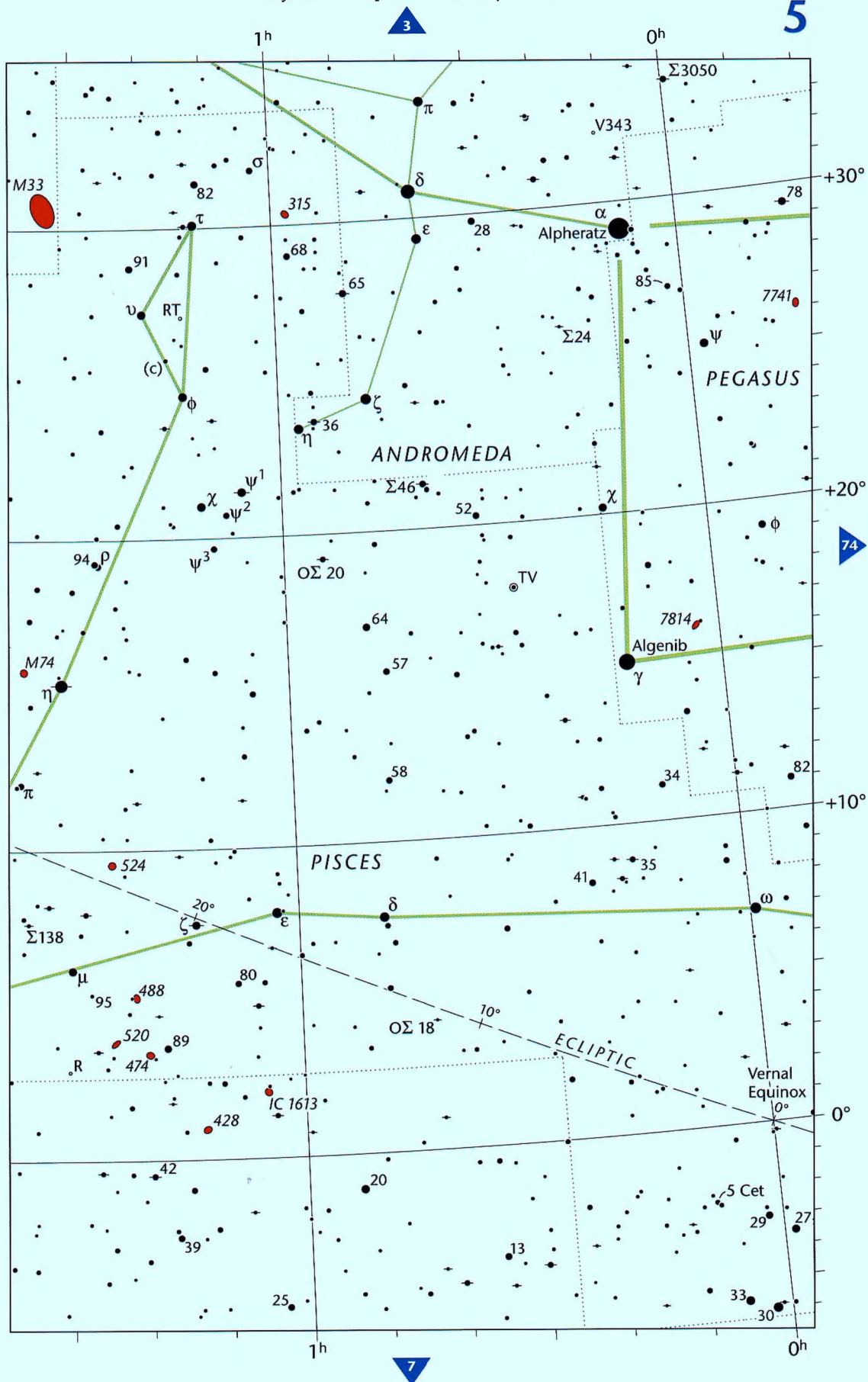


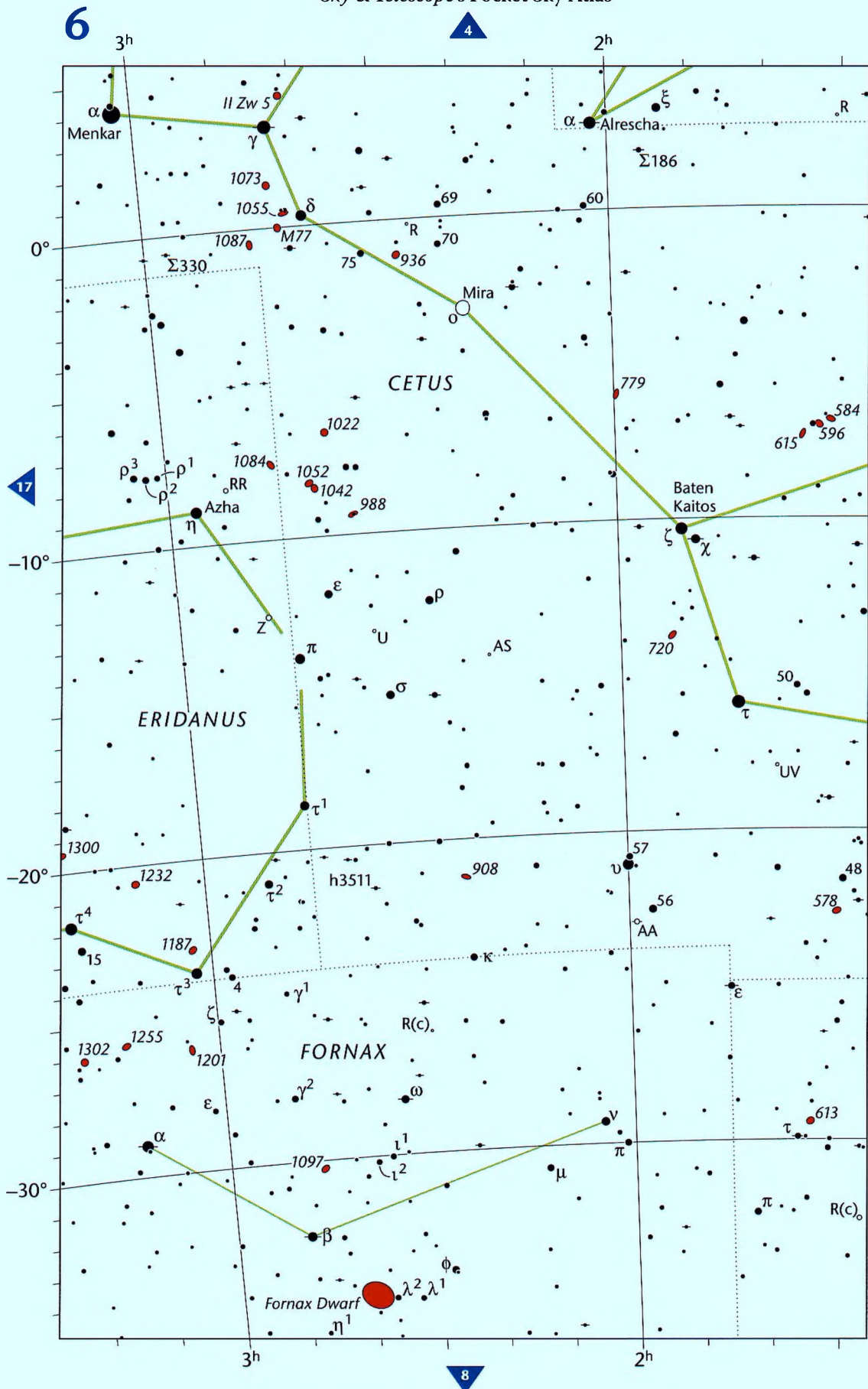


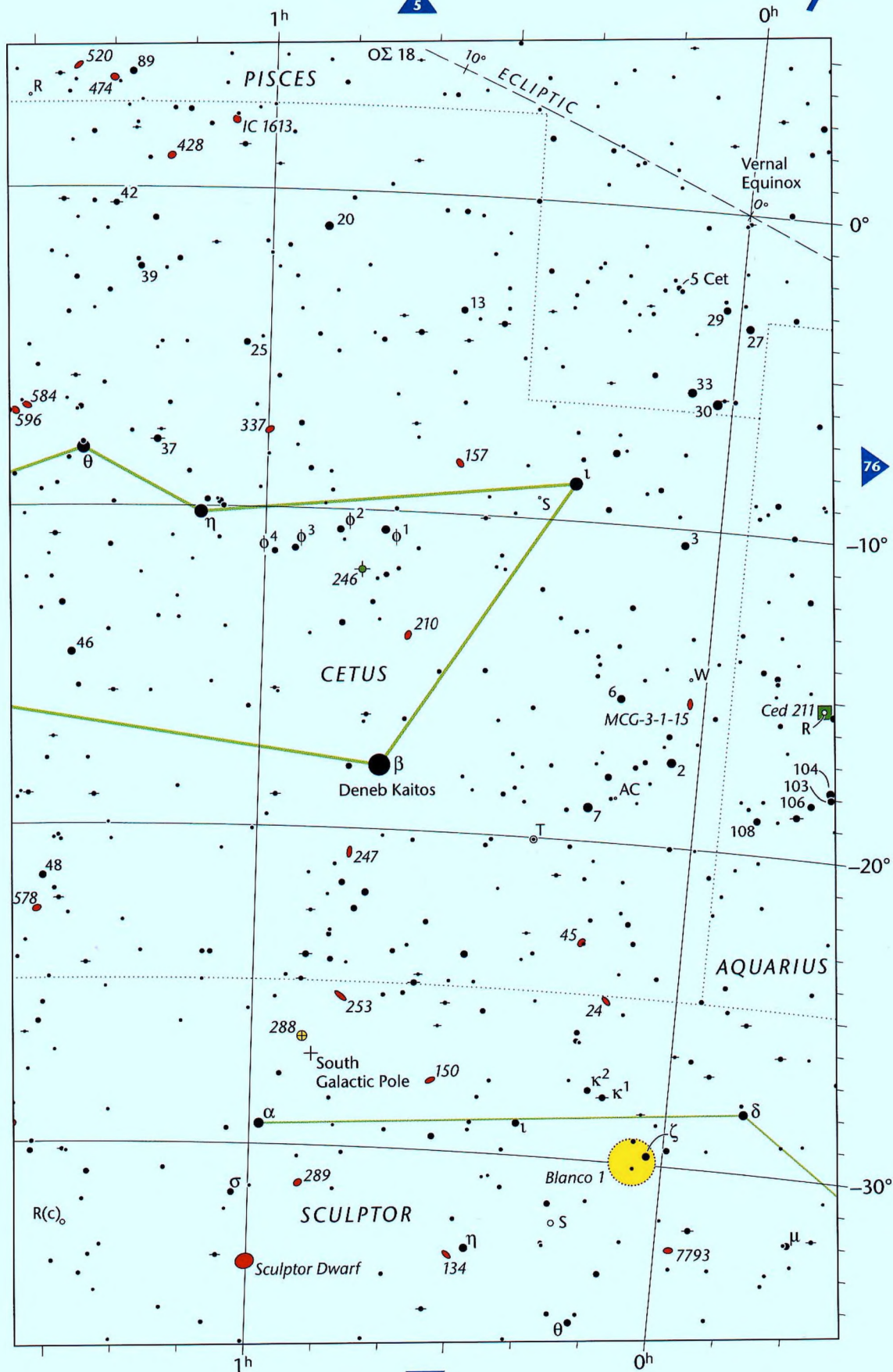


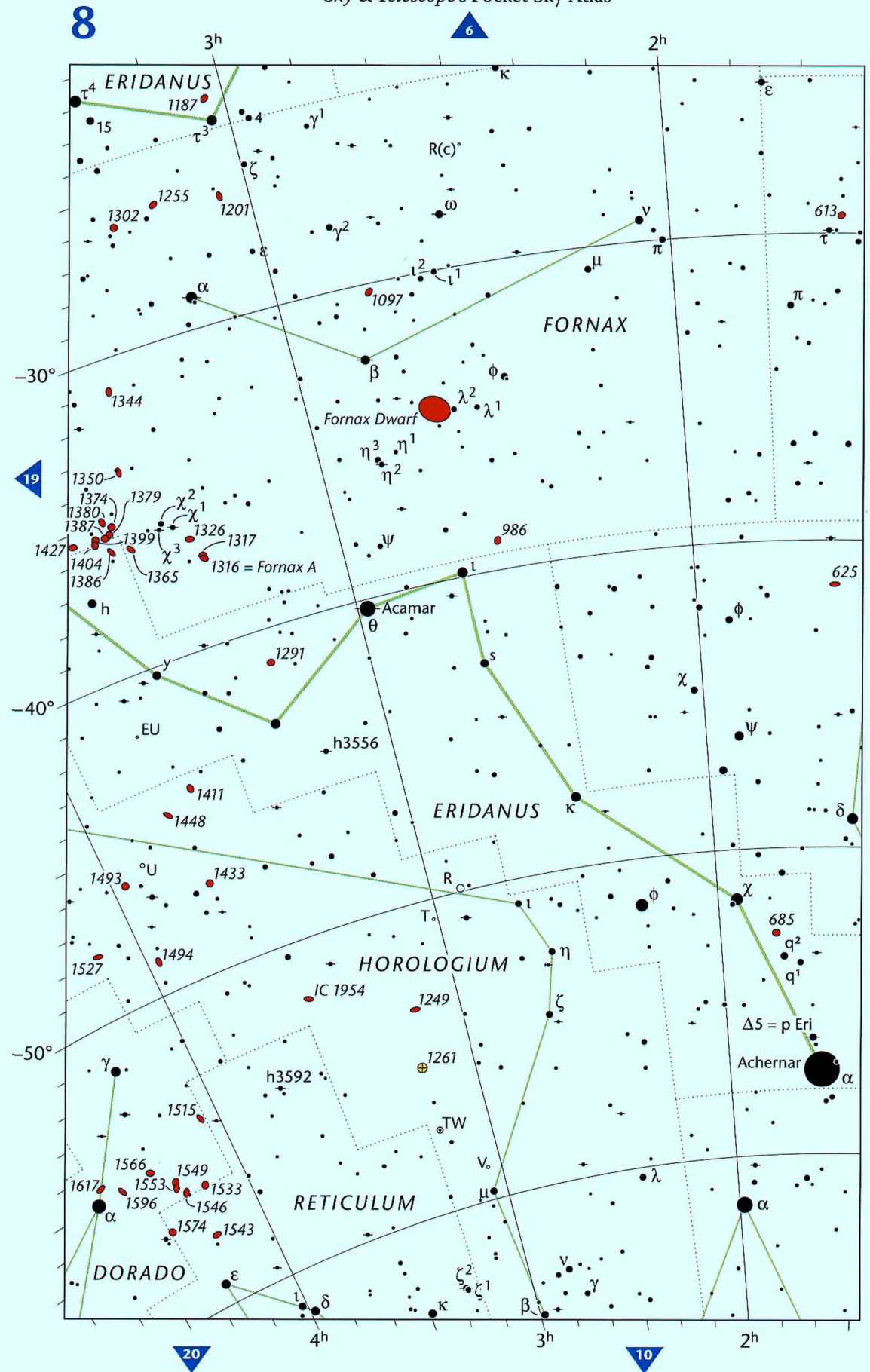


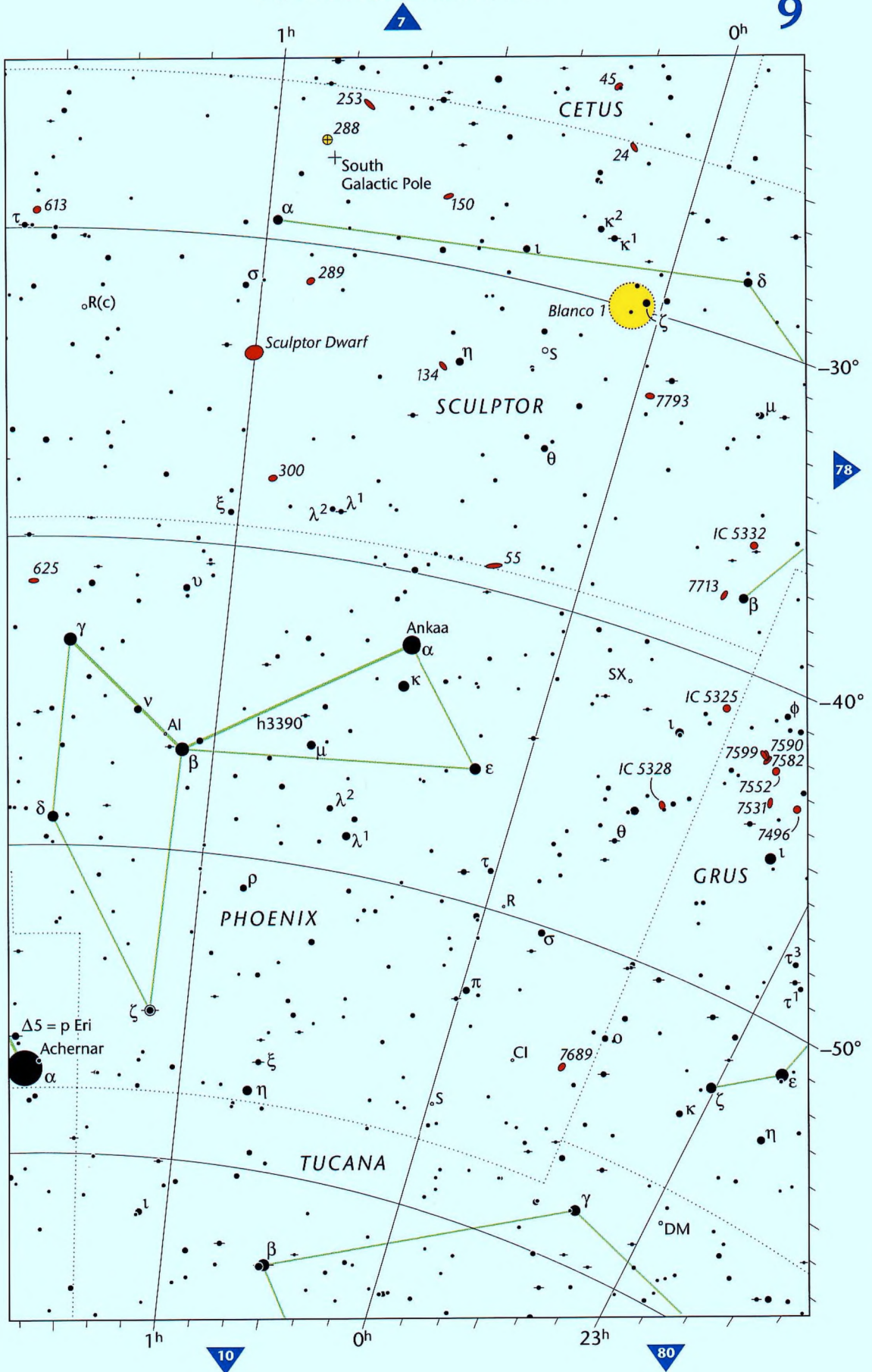


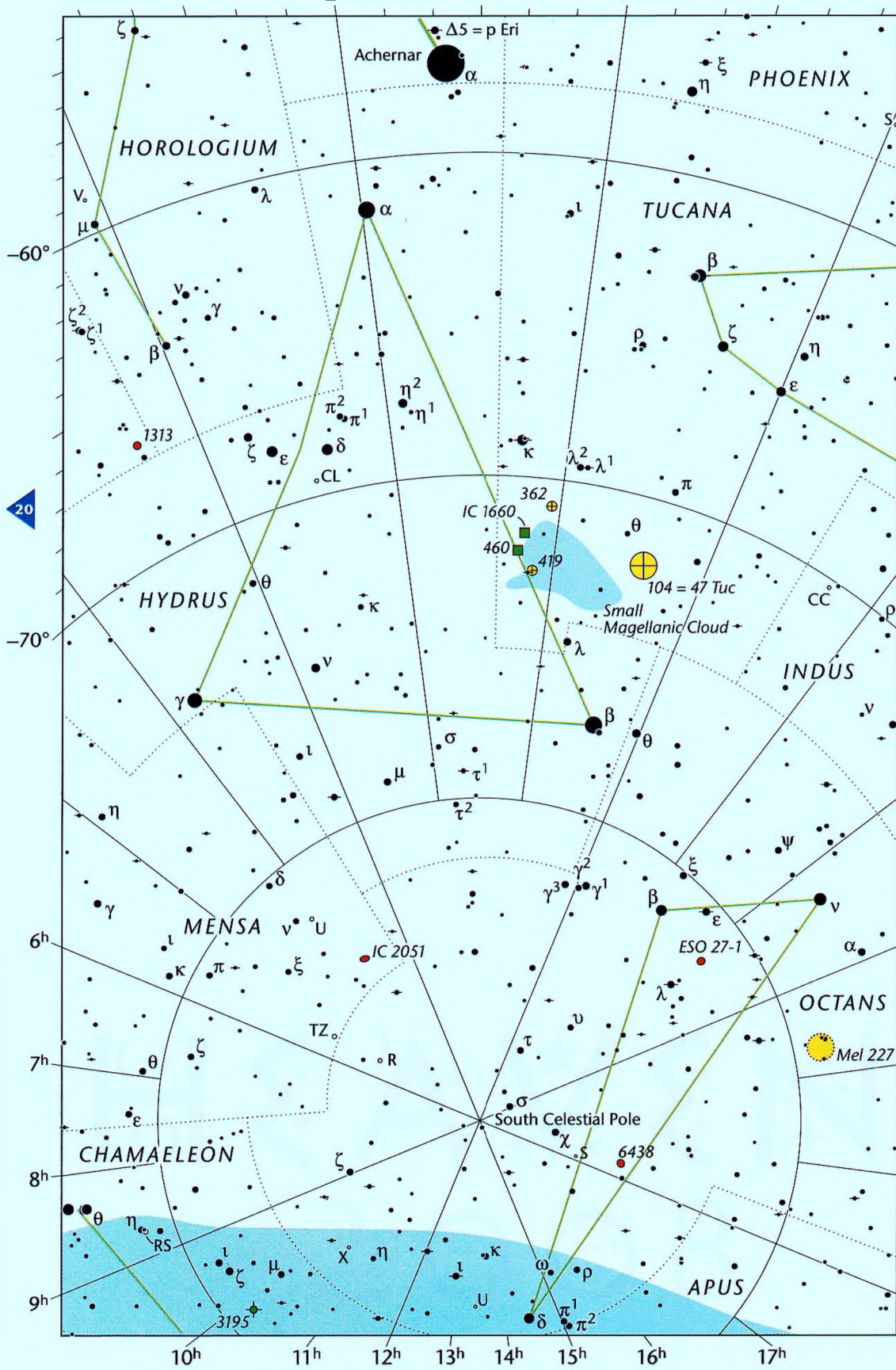












Charts 11-20

Right Ascension 3^h to 6^h

This section is highest in the night sky
around these times:

Evening: January

Midnight: November & December

Morning: October

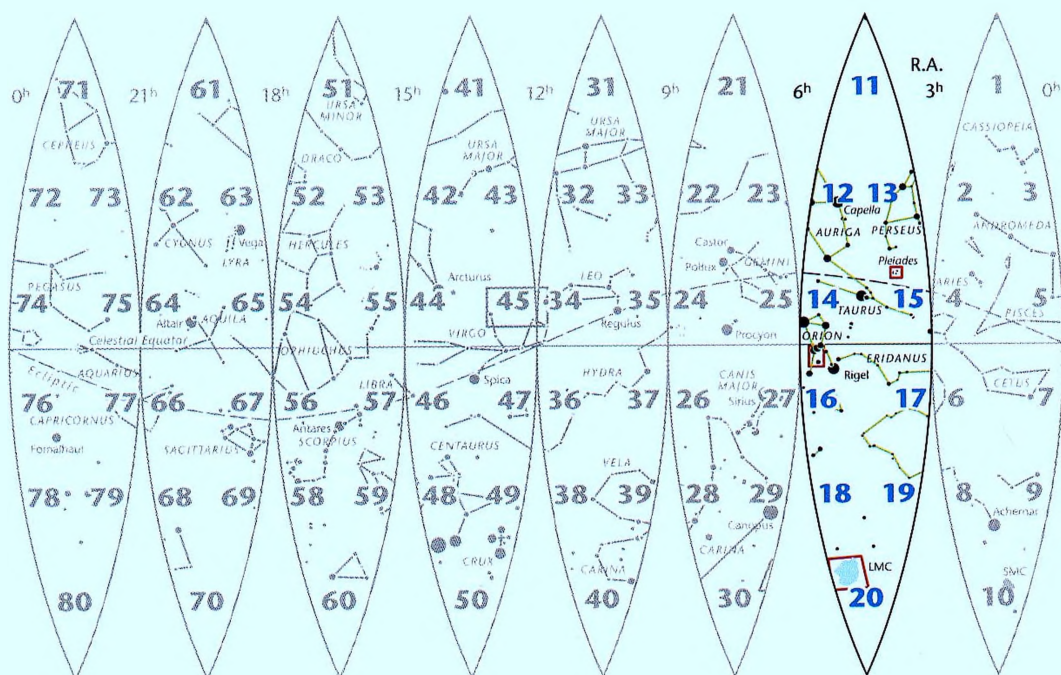


Chart Legend

● Double star

⊙ Variable stars

× Special object

+ Reference point

Open star clusters

50' (to scale) <20'

Globular clusters

50' (to scale) <20'

Galaxies

100' x 20' (to scale)

40' x 30' (to scale)

<20'

Bright nebulae

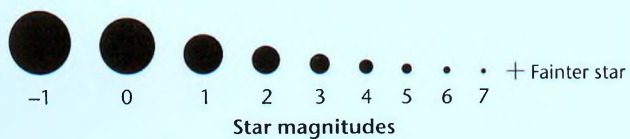
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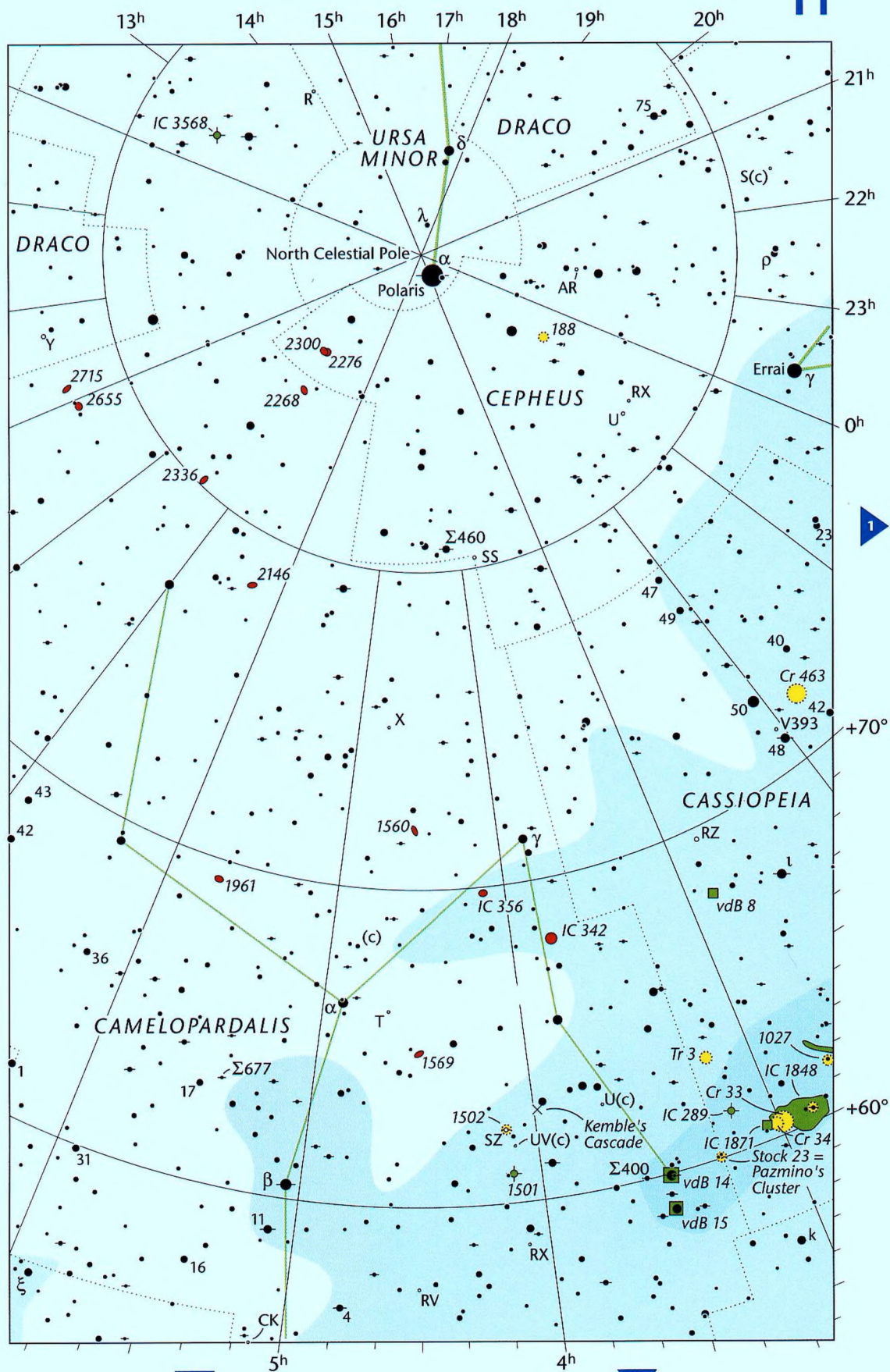
Dark nebulae

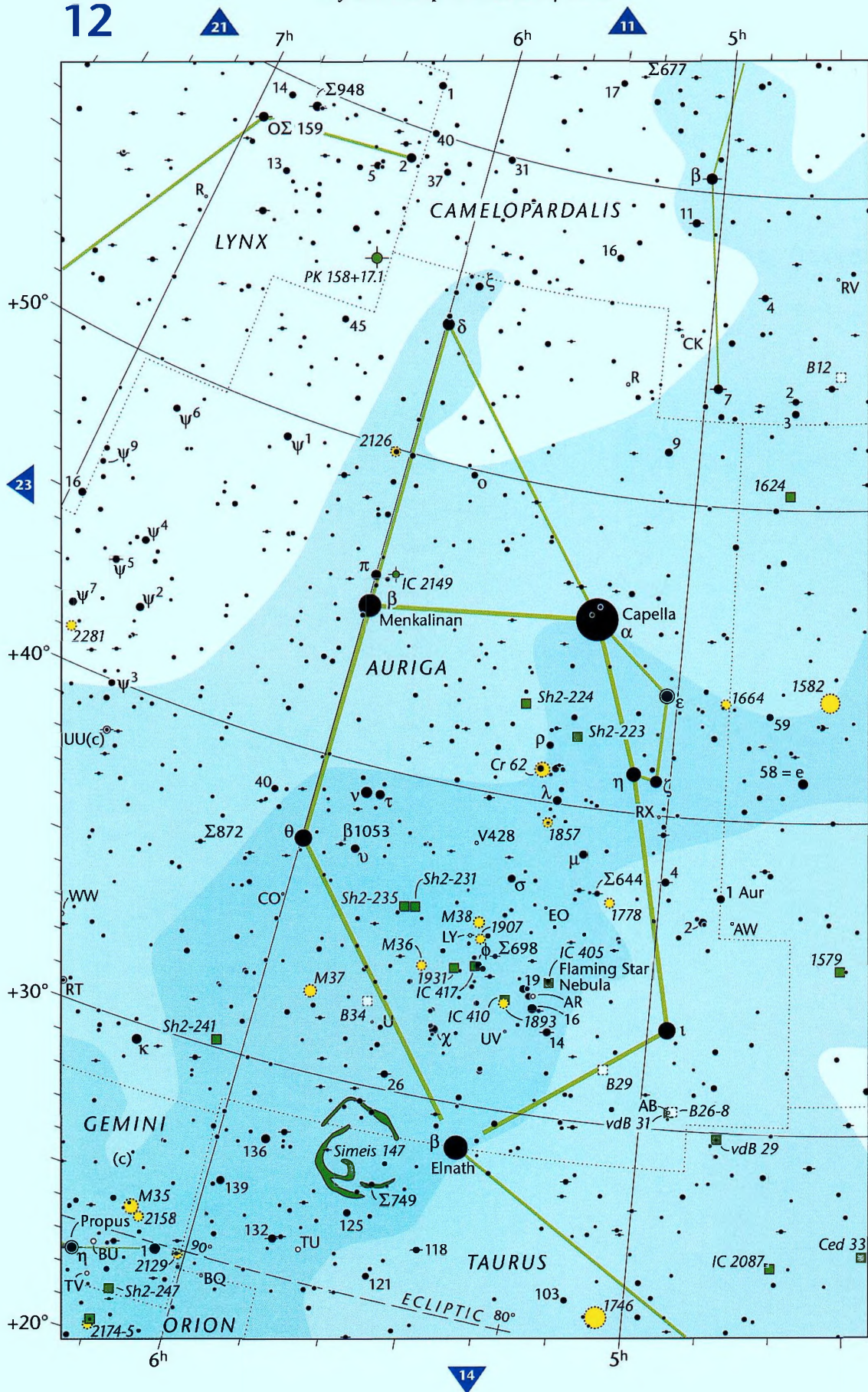
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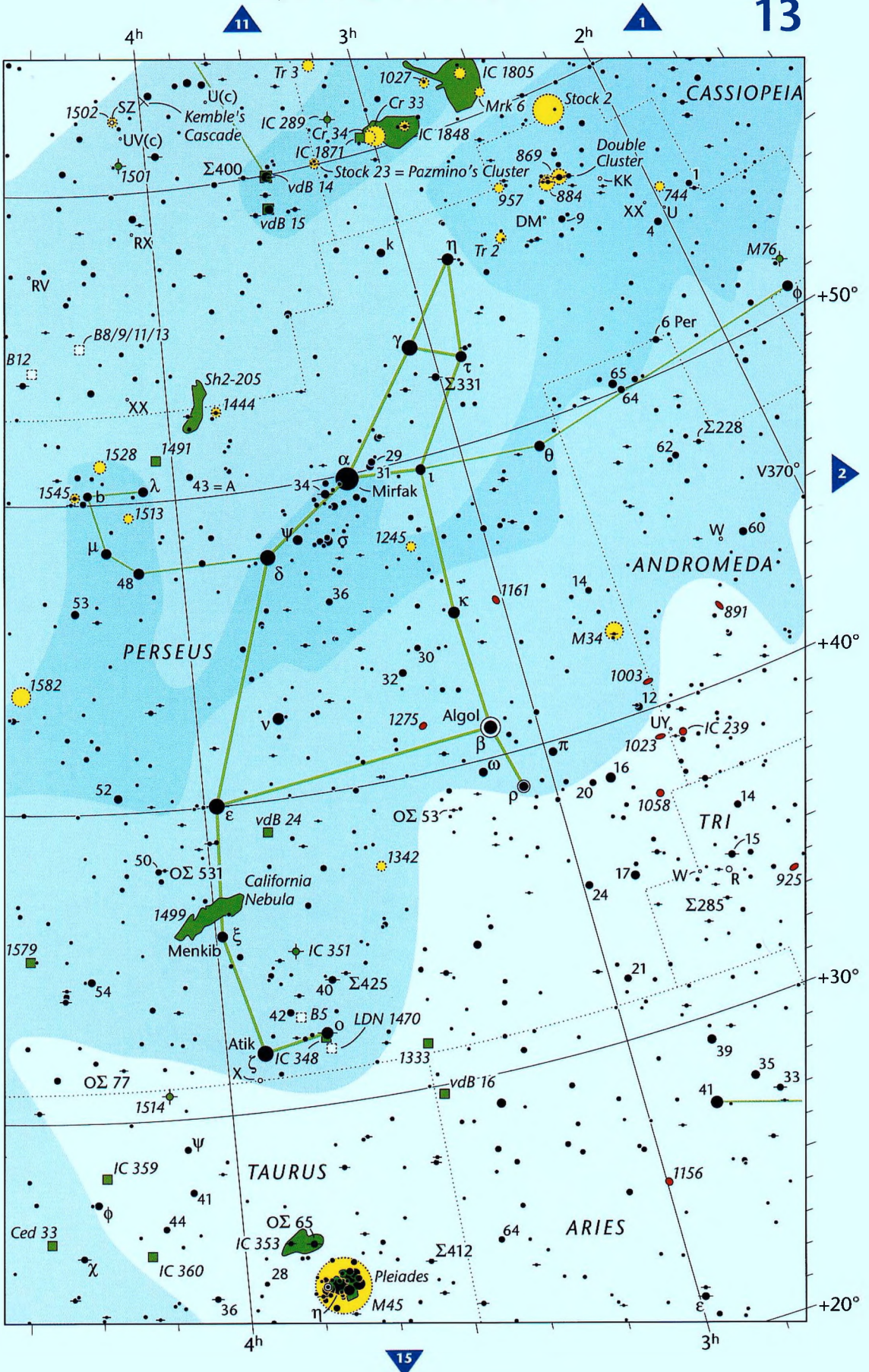
Planetary nebulae

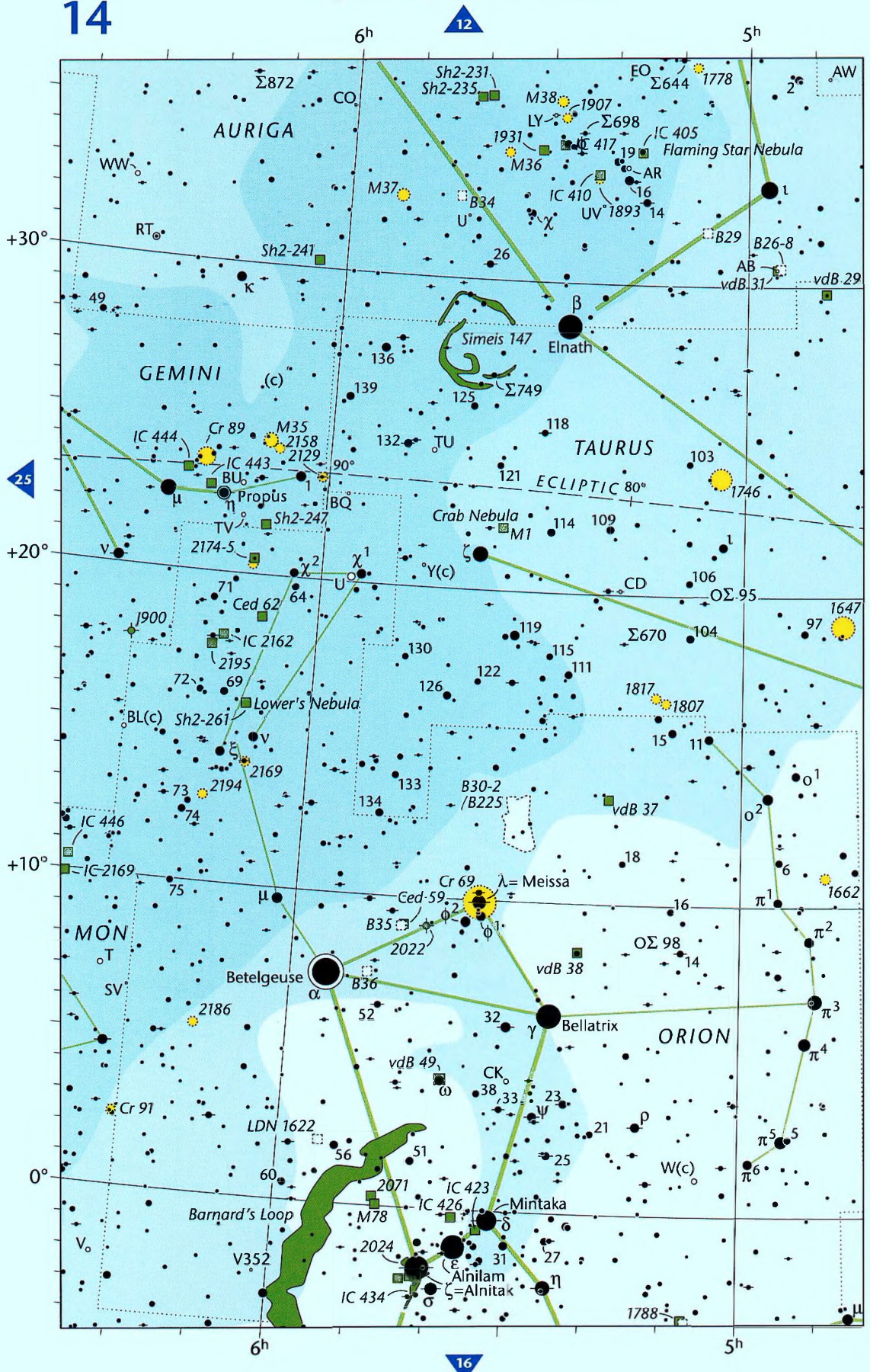
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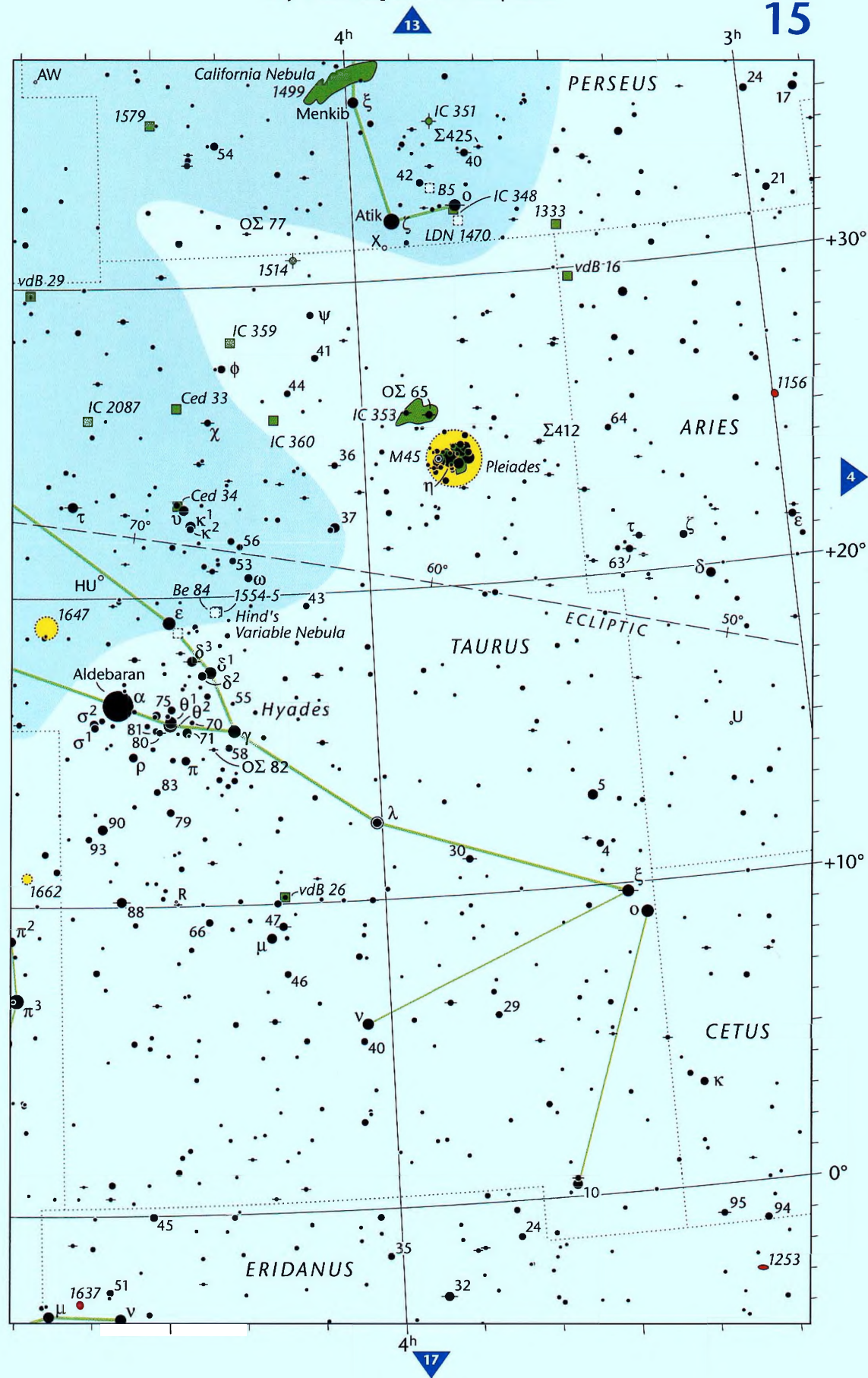


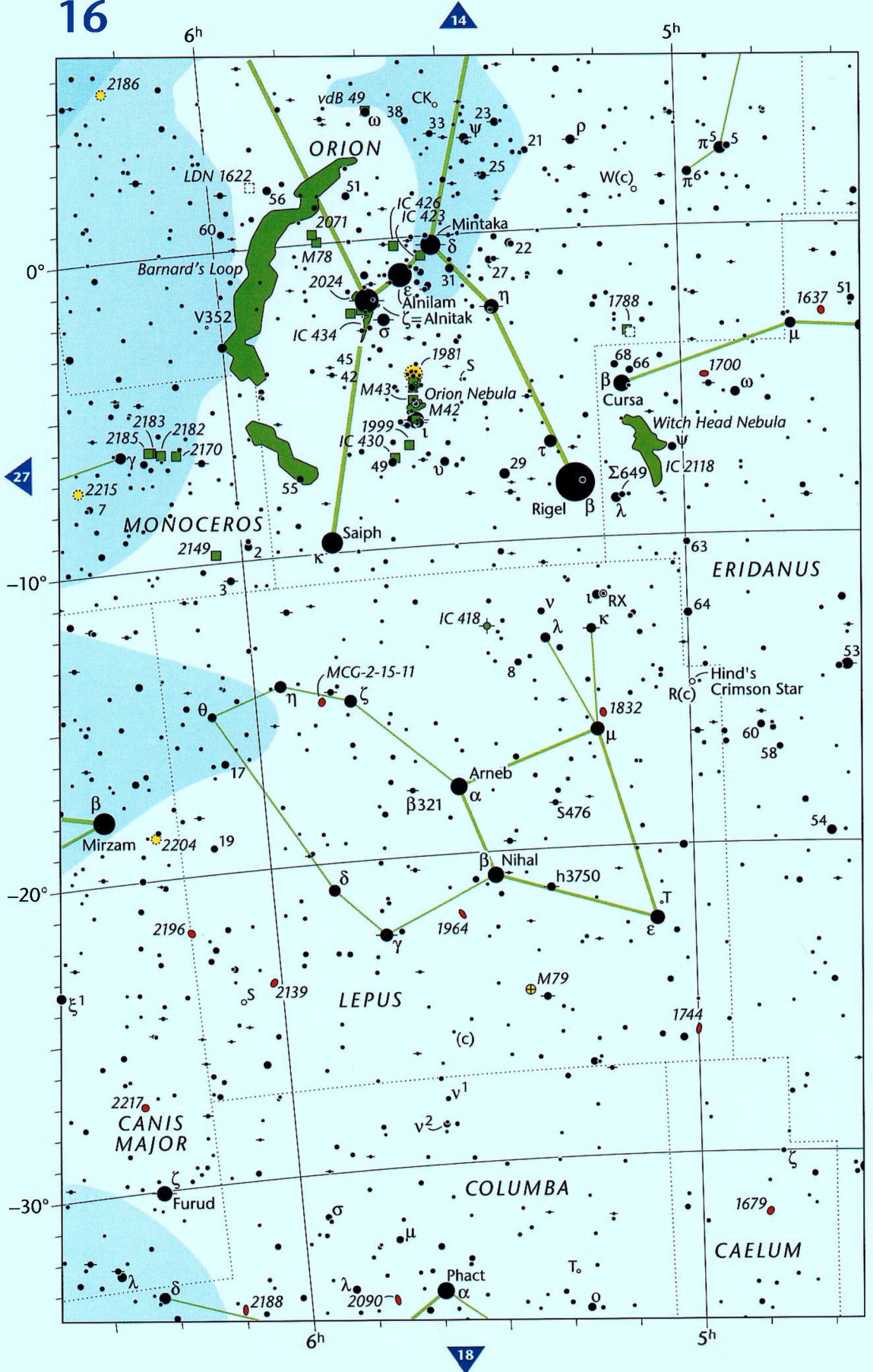


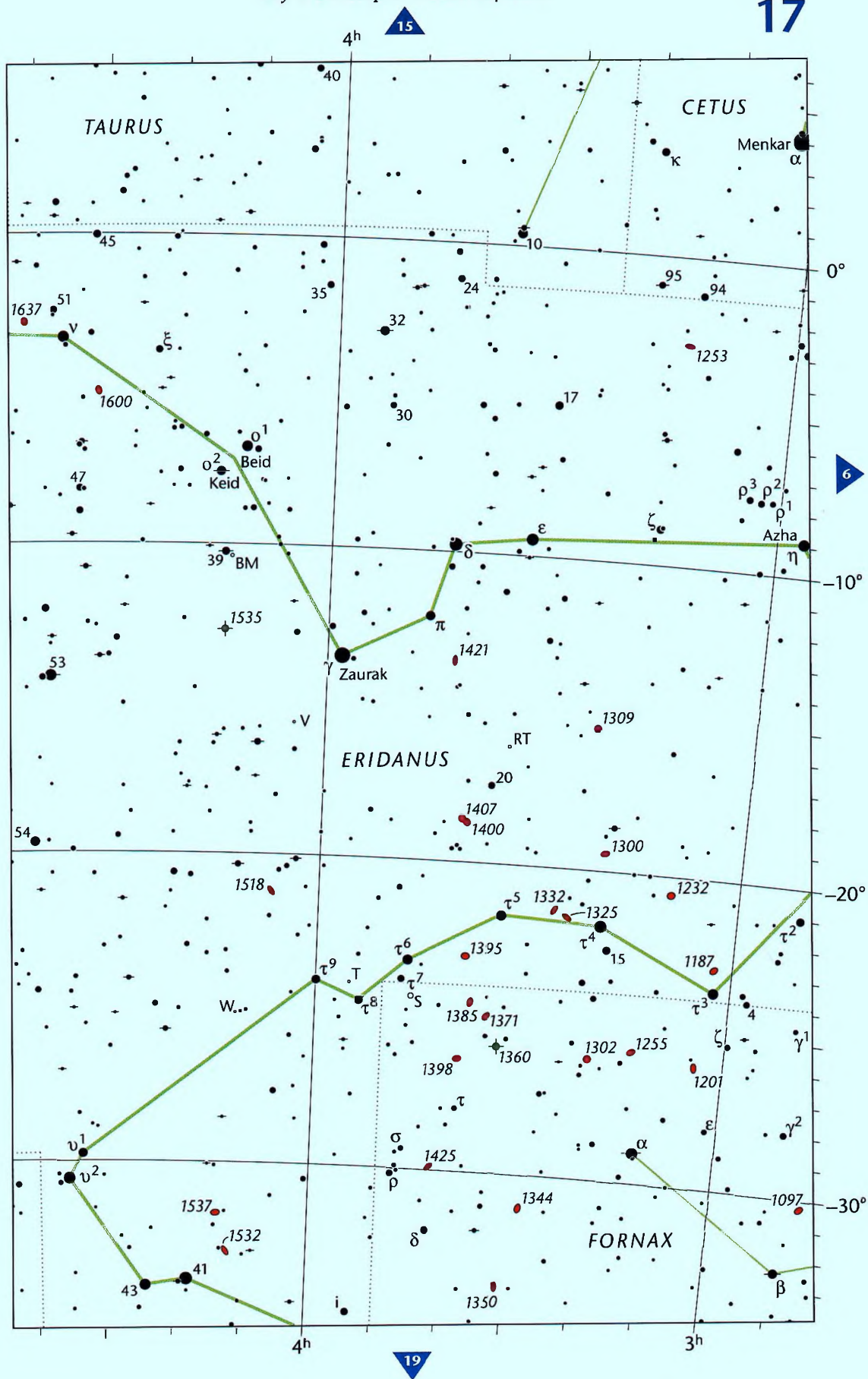


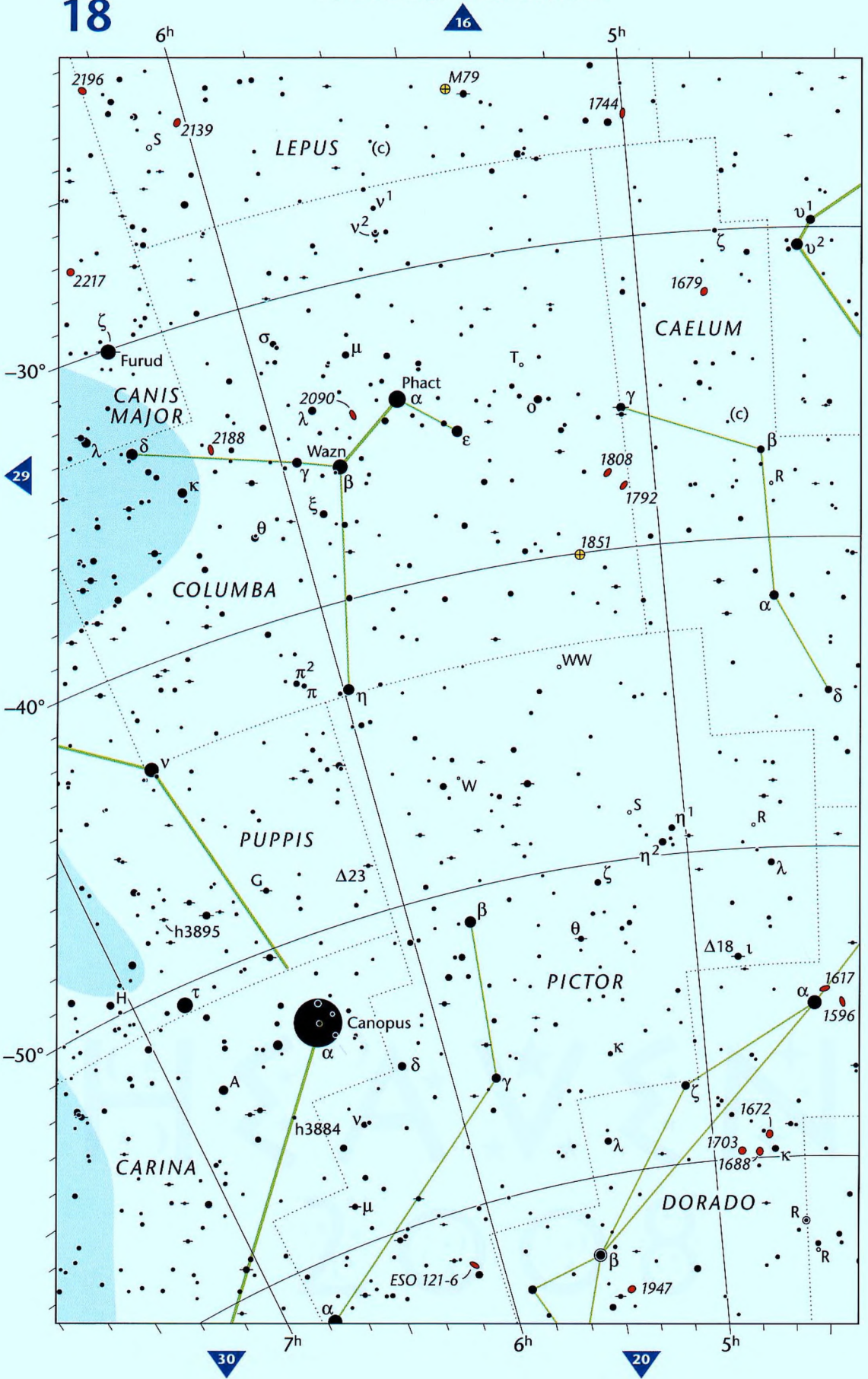


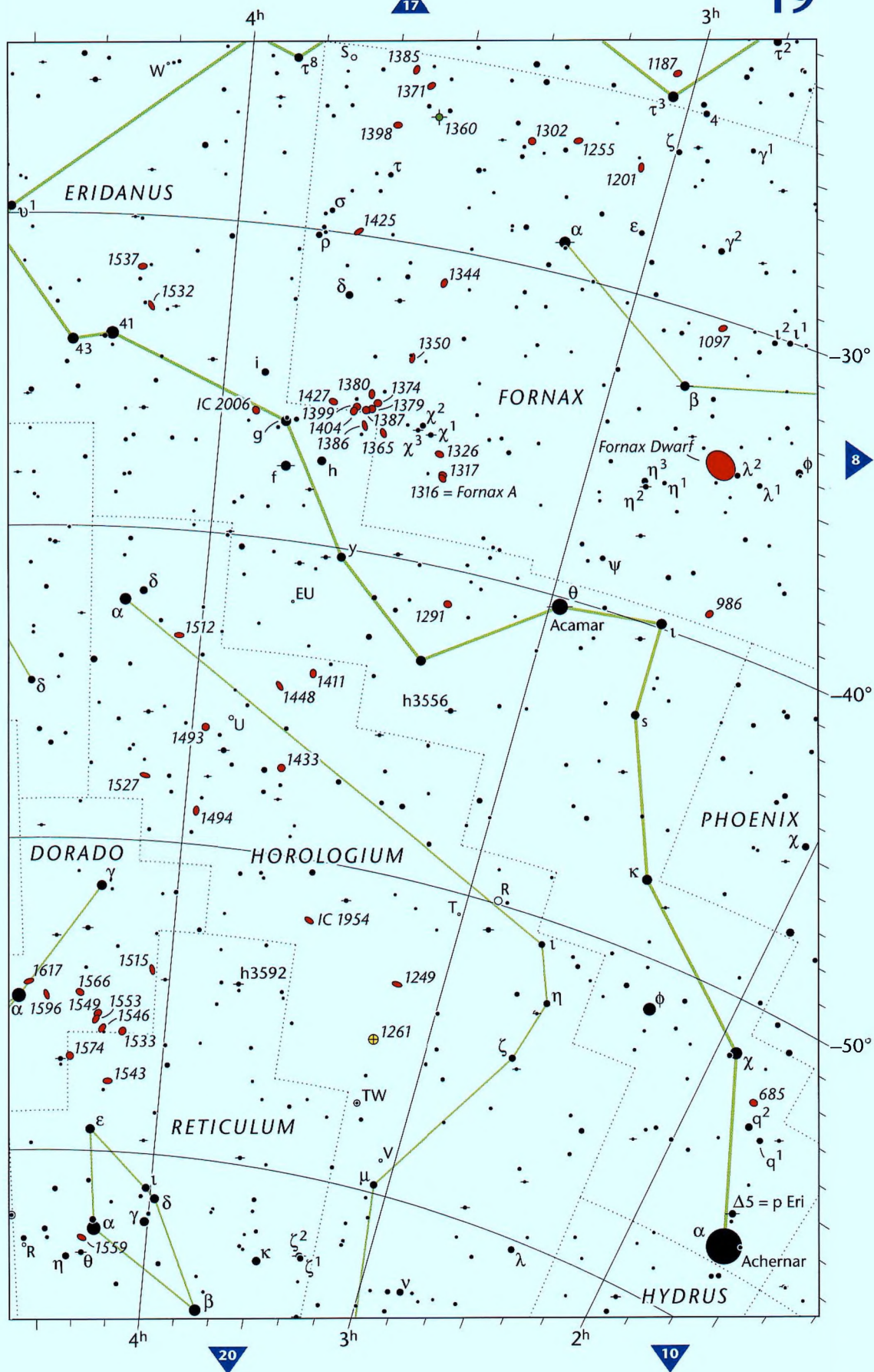


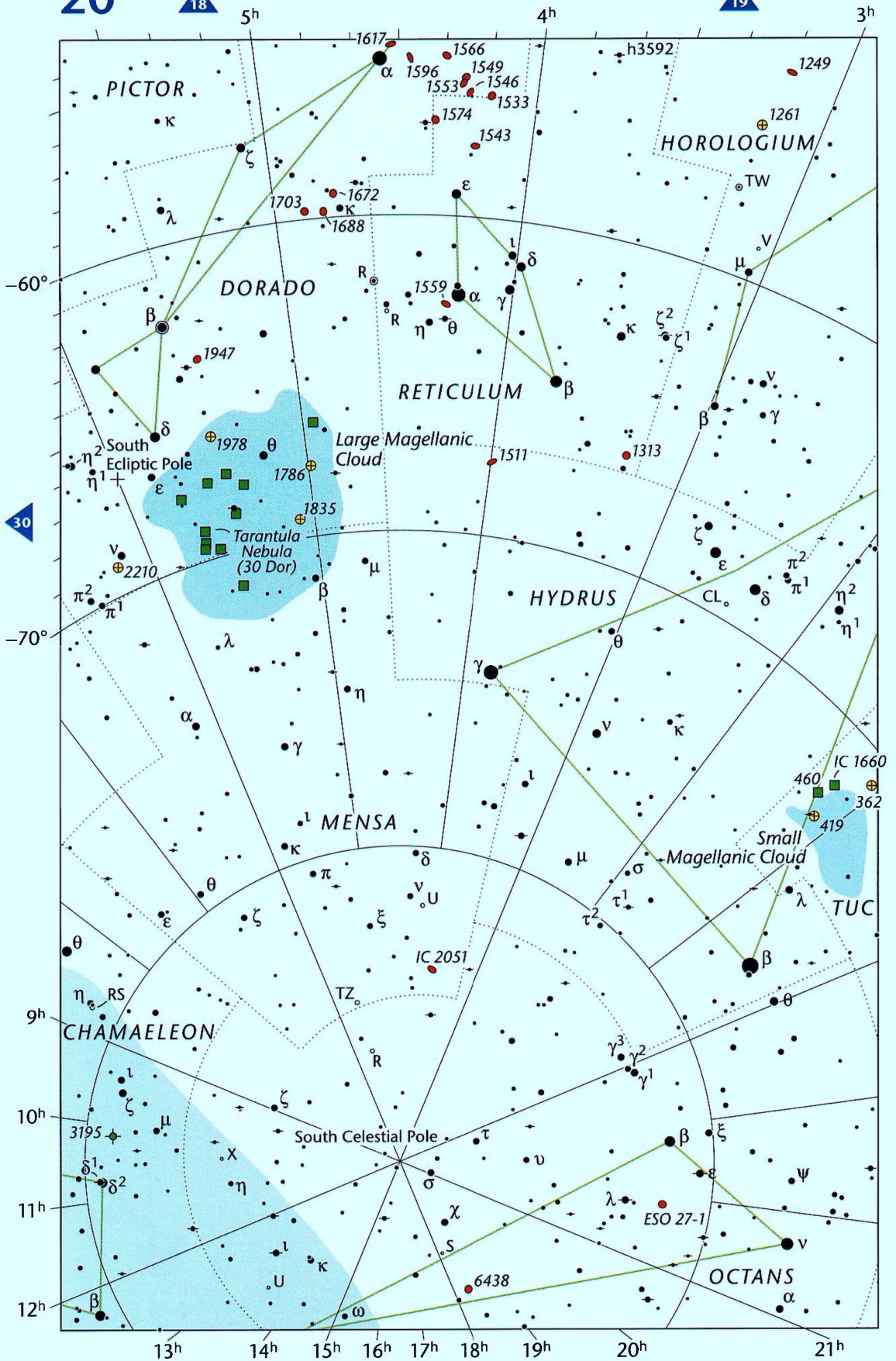












Charts 21–30

Right Ascension 6^h to 9^h

This section is highest in the night sky
around these times:

Evening: February & March

Midnight: January

Morning: November & December

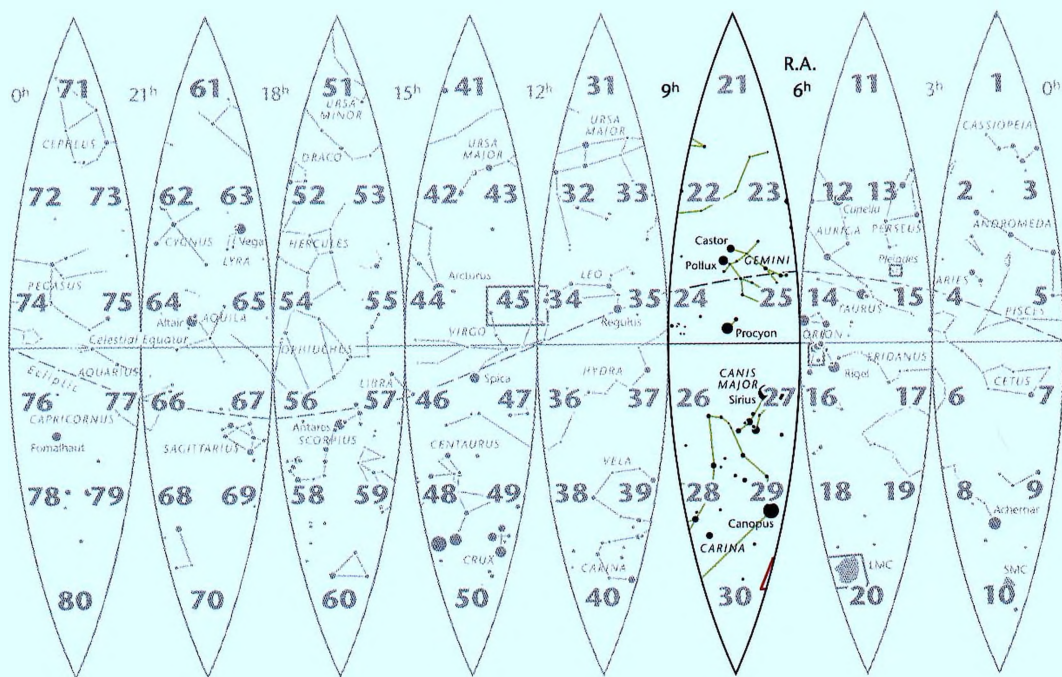


Chart Legend

● Double star

⊙ Variable stars

× Special object

+ Reference point

Open star clusters

50' (to scale) <20'

Globular clusters

50' (to scale) <20'

Galaxies

100' x 20' (to scale)

40' x 30' (to scale)

<20'

Bright nebulae

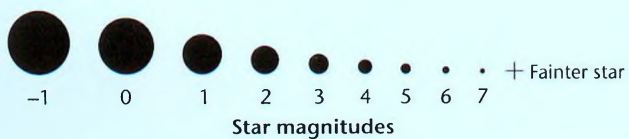
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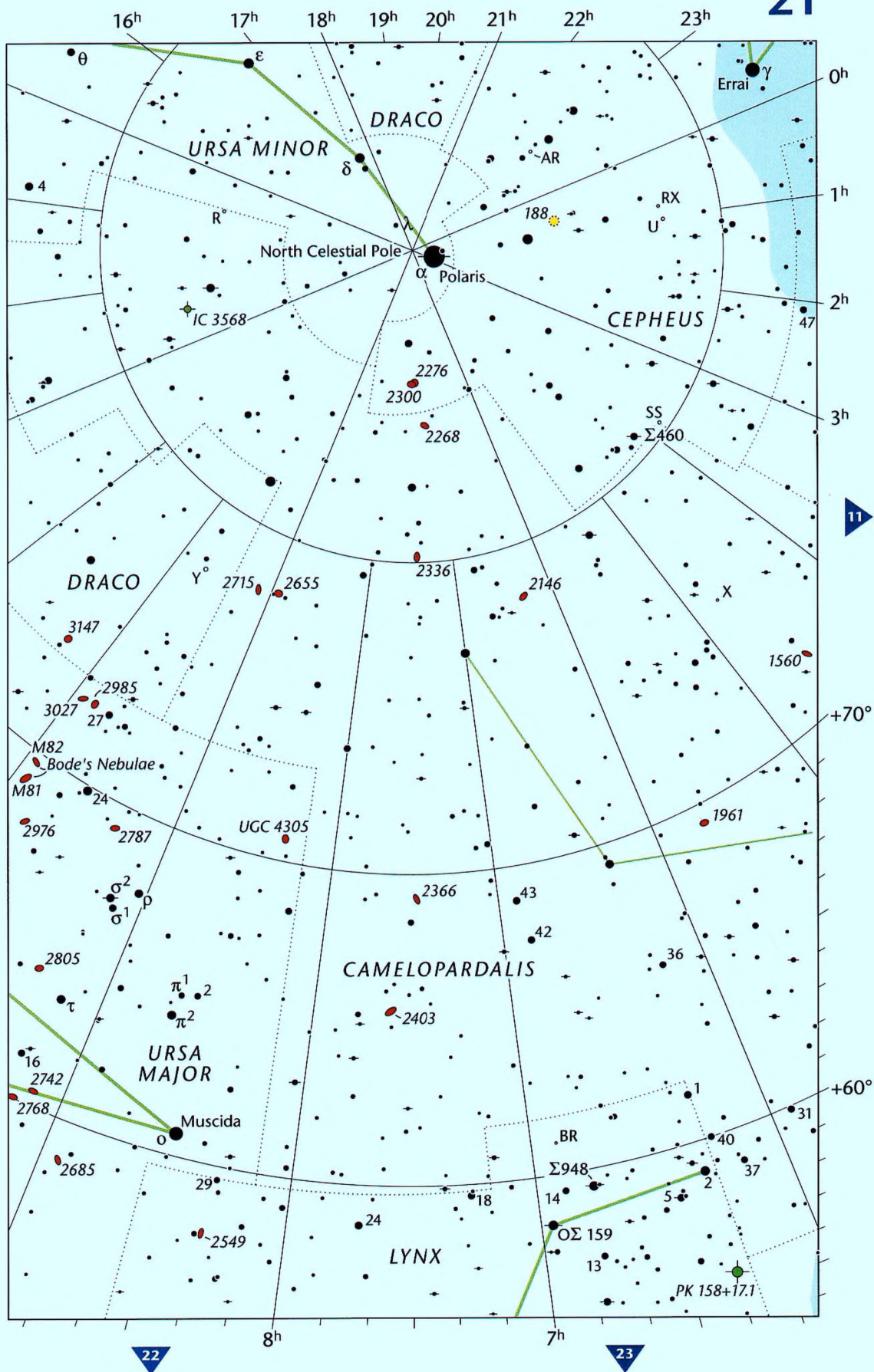
Dark nebulae

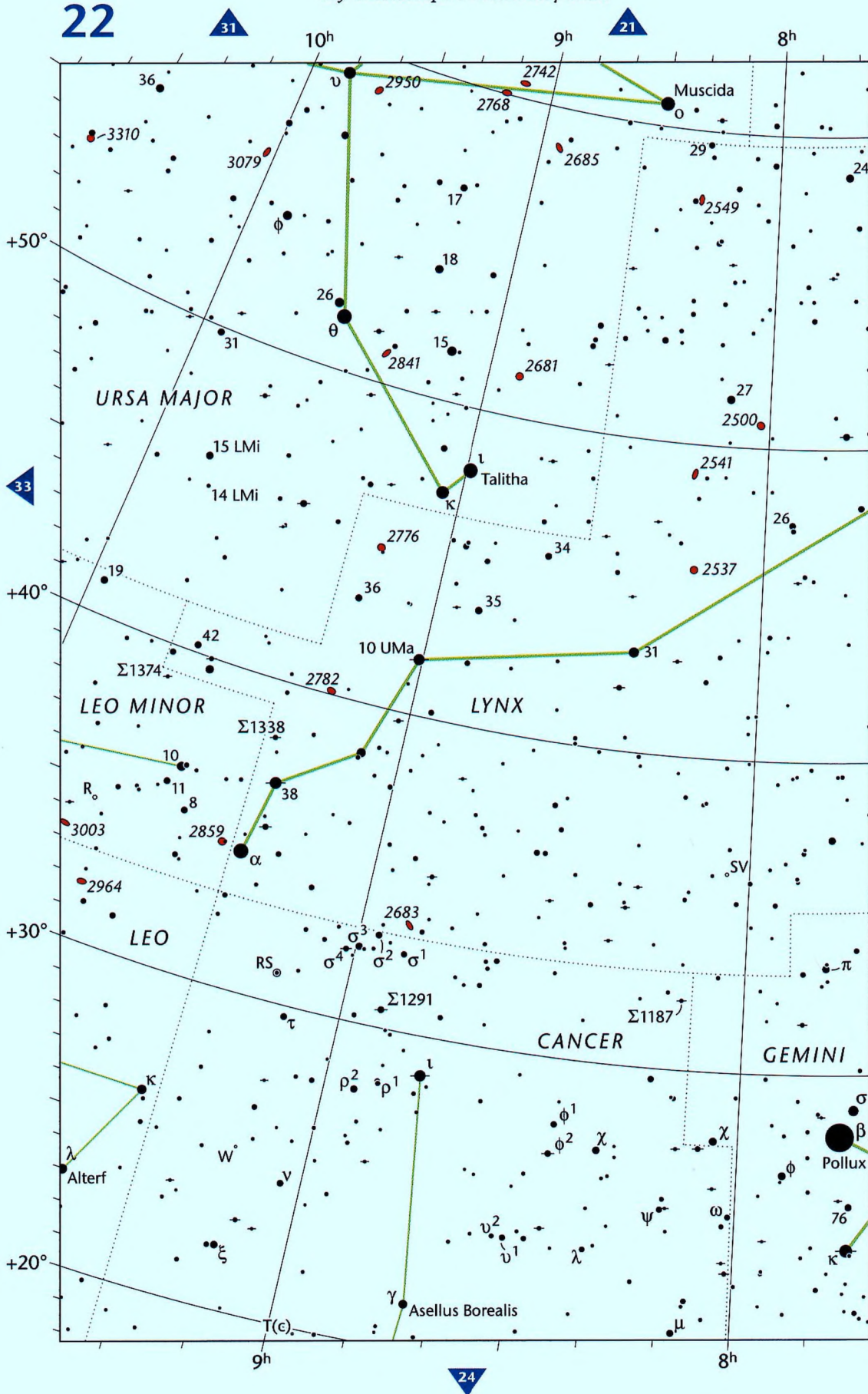
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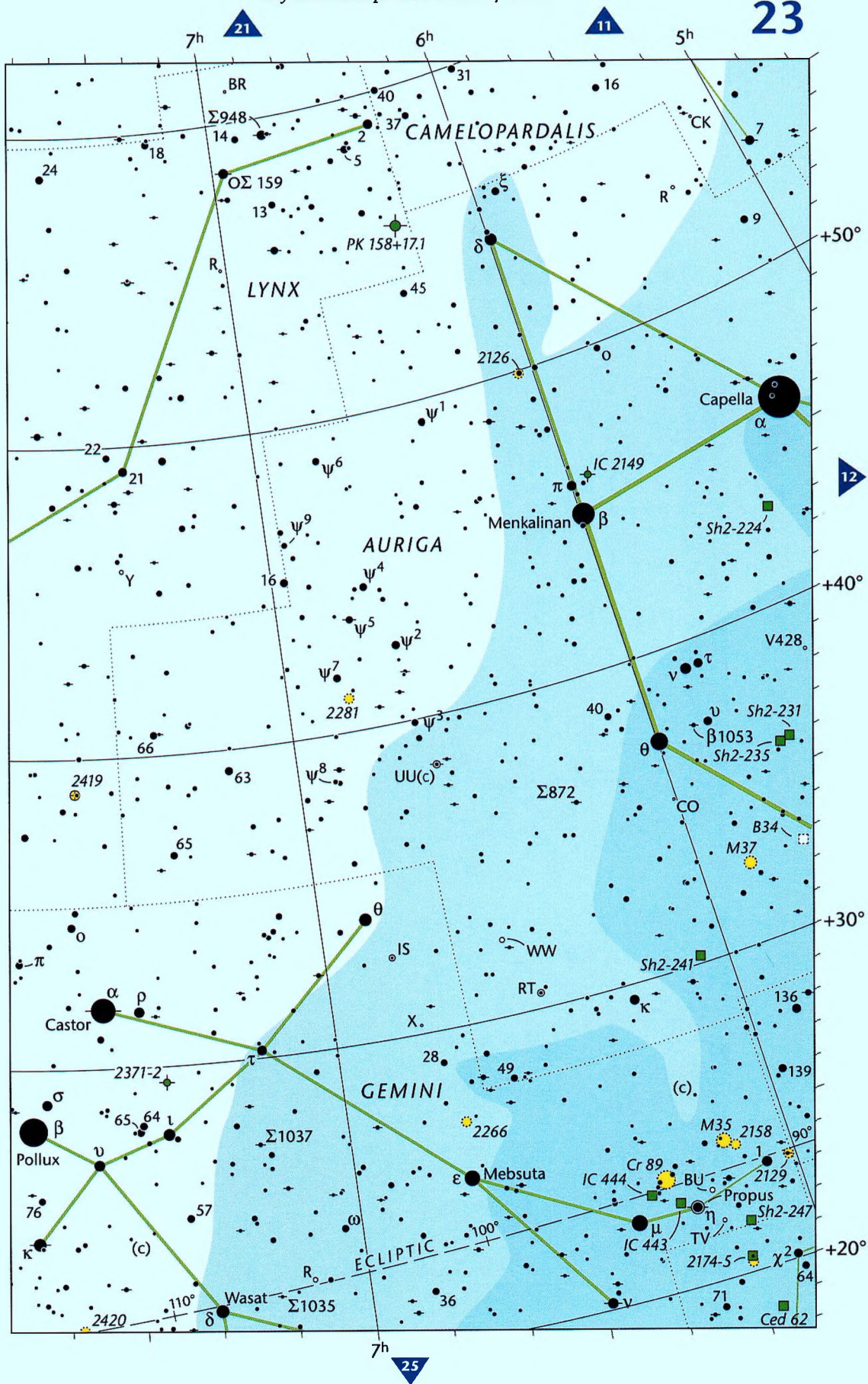
Planetary nebulae

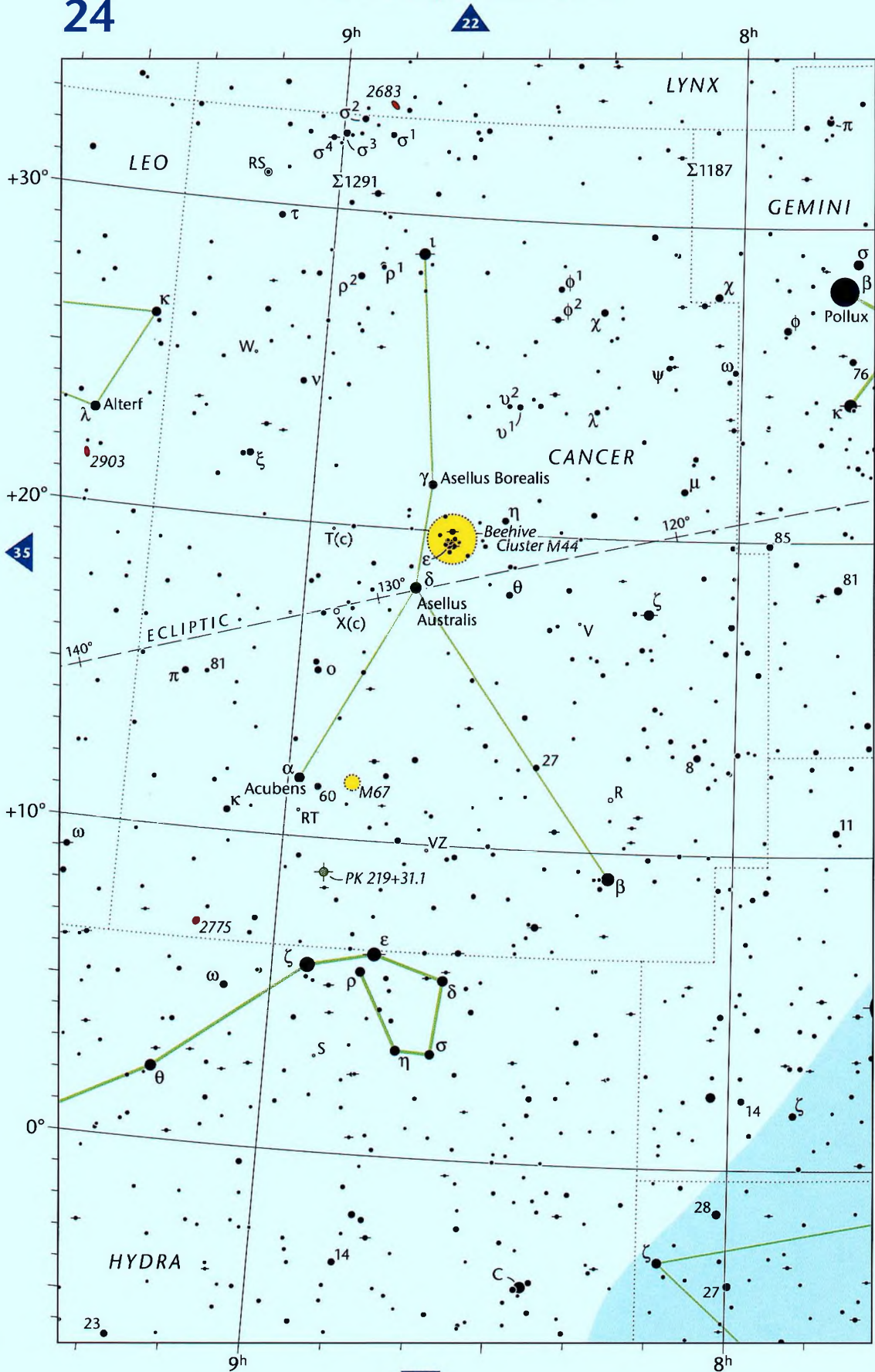
50' (to scale) <20'

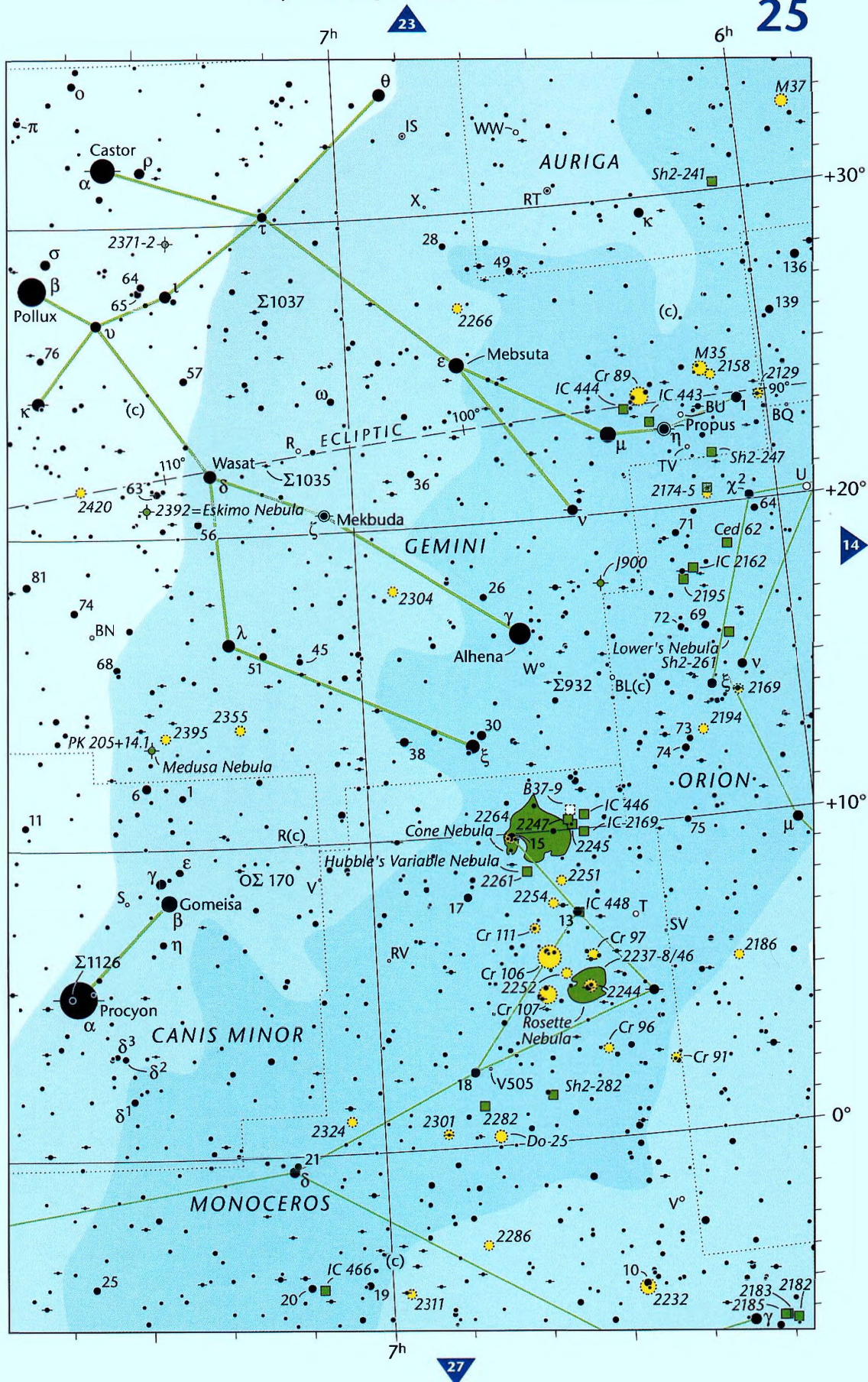


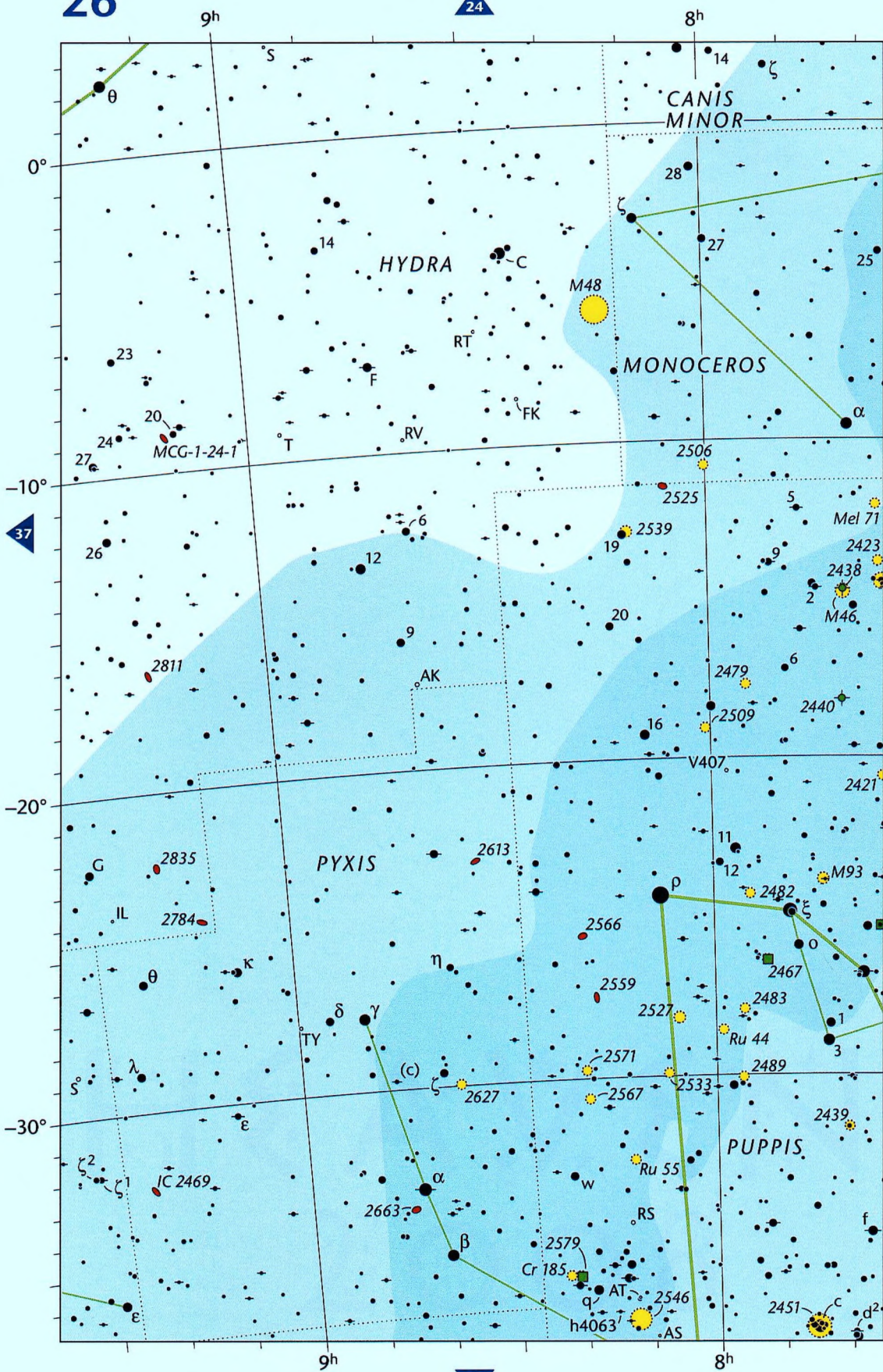


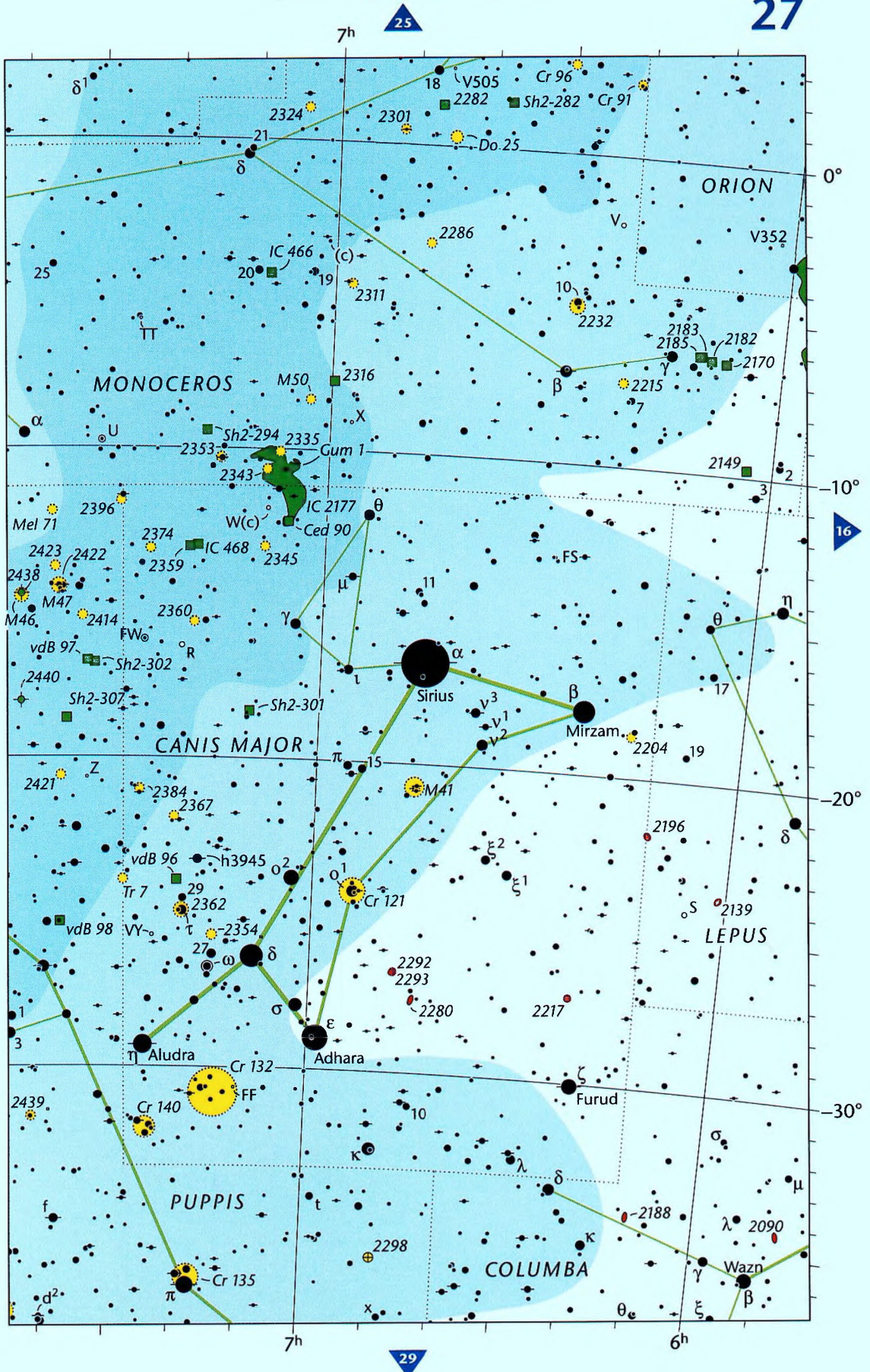


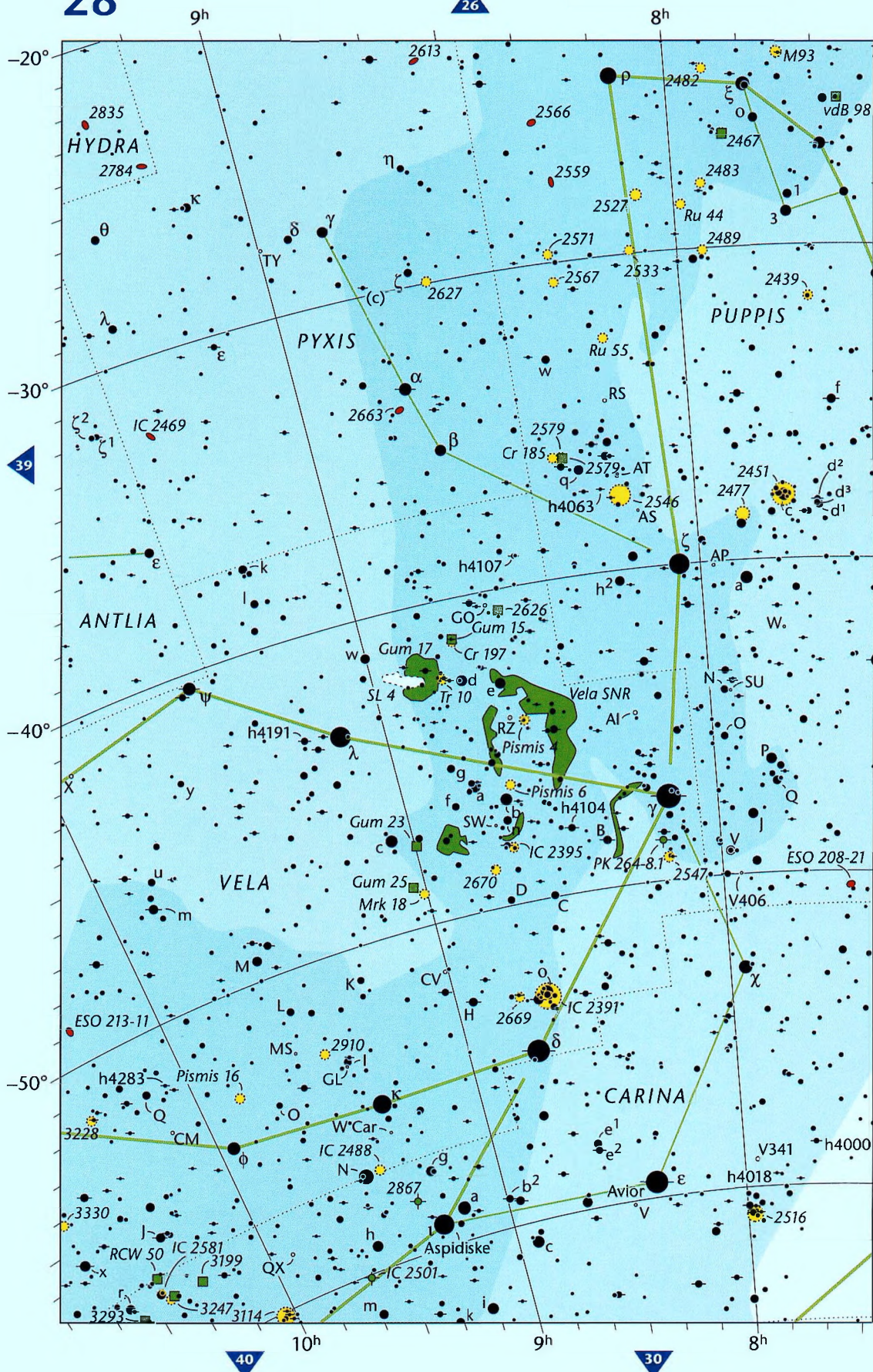


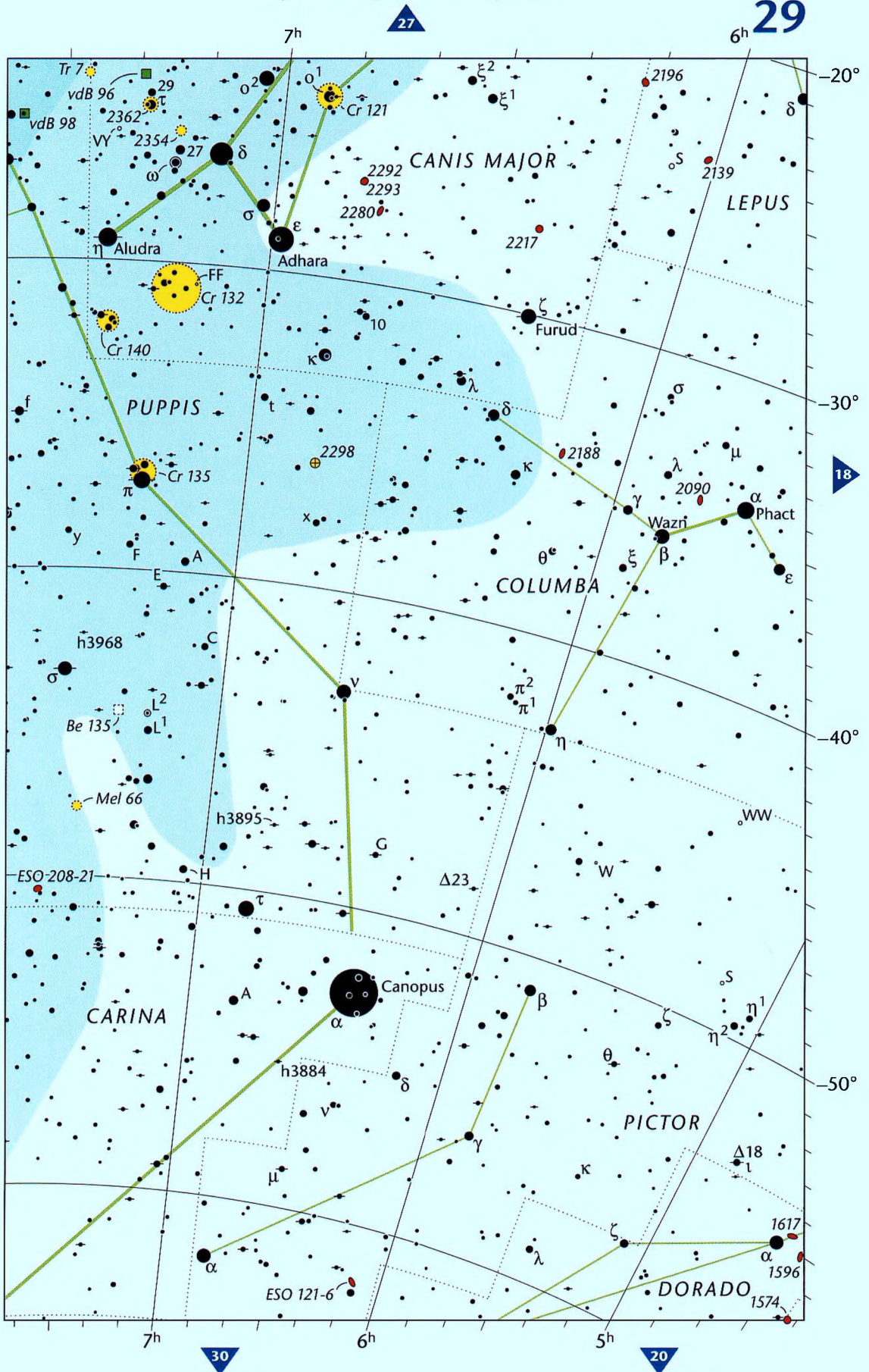


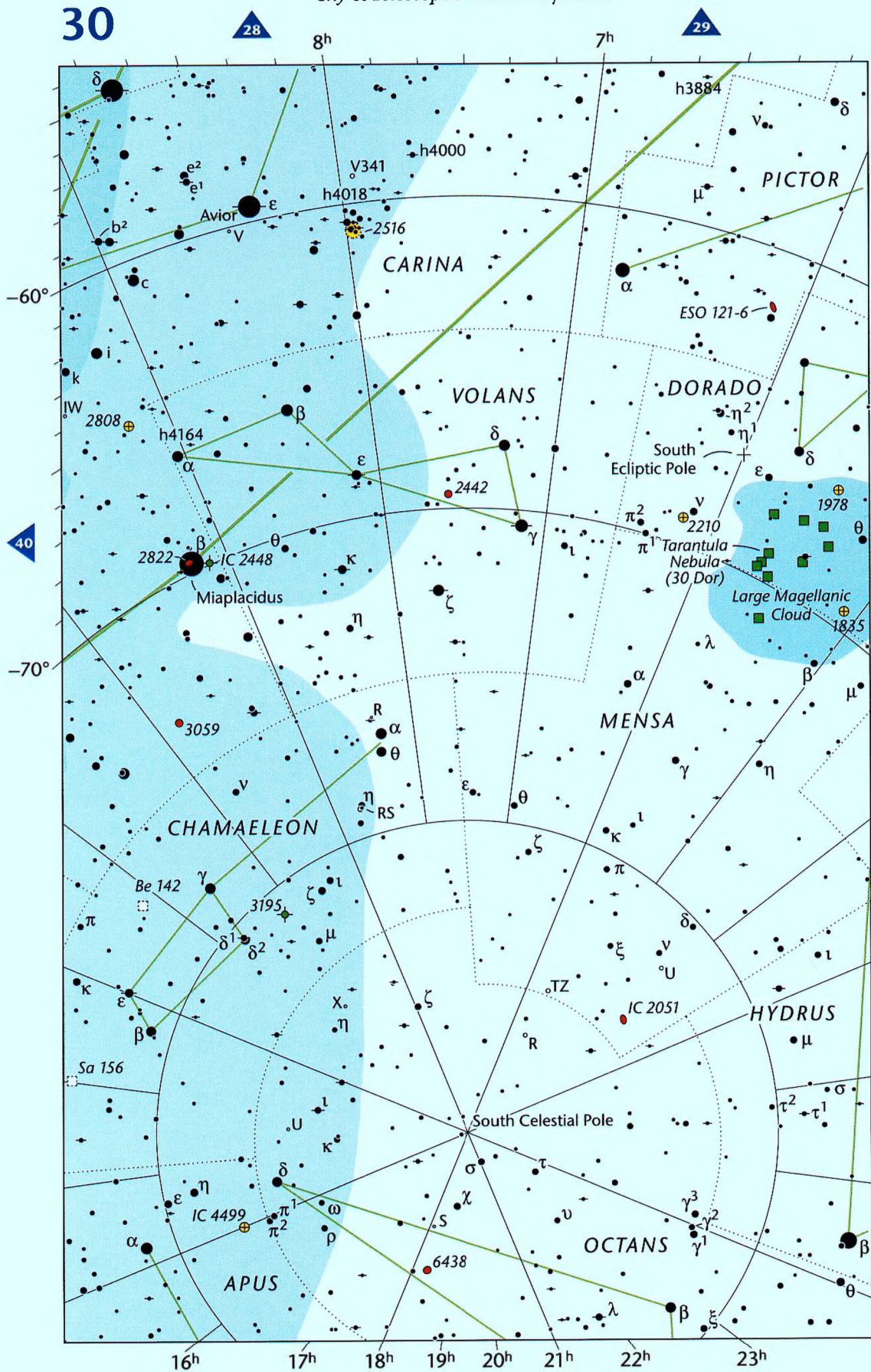












Charts 31-40

Right Ascension 9^h to 12^h

This section is highest in the night sky
around these times:

Evening: April

Midnight: February & March

Morning: January

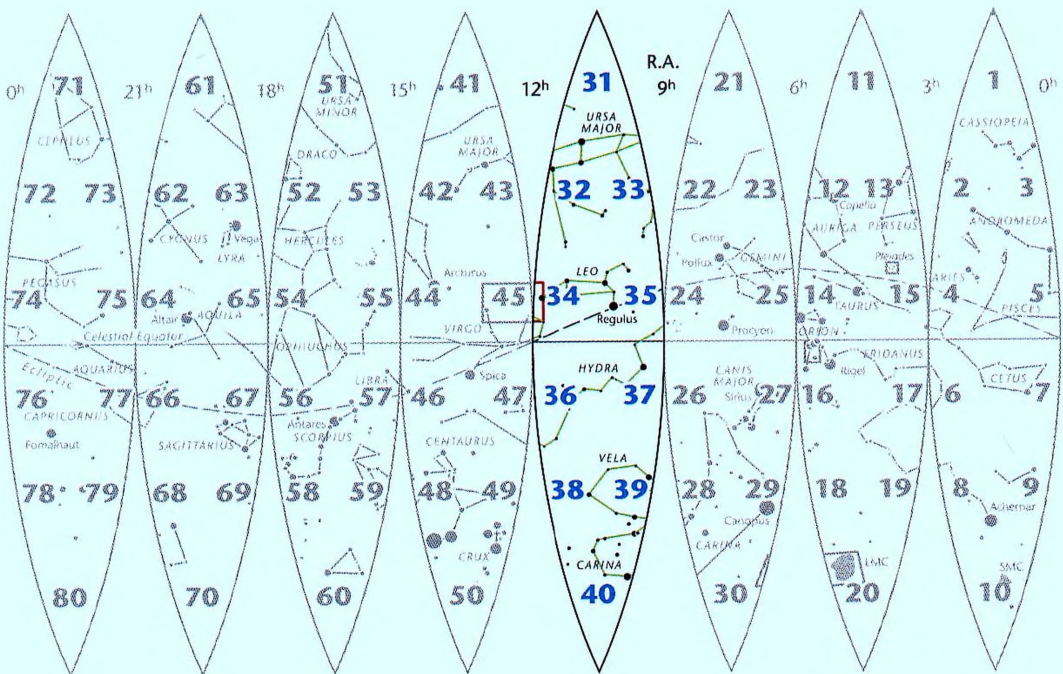


Chart Legend

● Double star

⊙ Variable stars

× Special object

+ Reference point

Open star clusters

50' (to scale) <20'

Globular clusters

50' (to scale) <20'

Galaxies

100' x 20' (to scale)

40' x 30' (to scale)

<20'

Bright nebulae

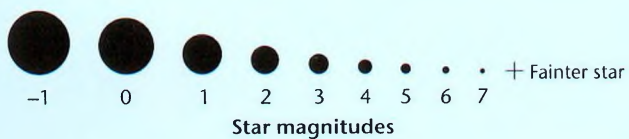
(to scale) <20'

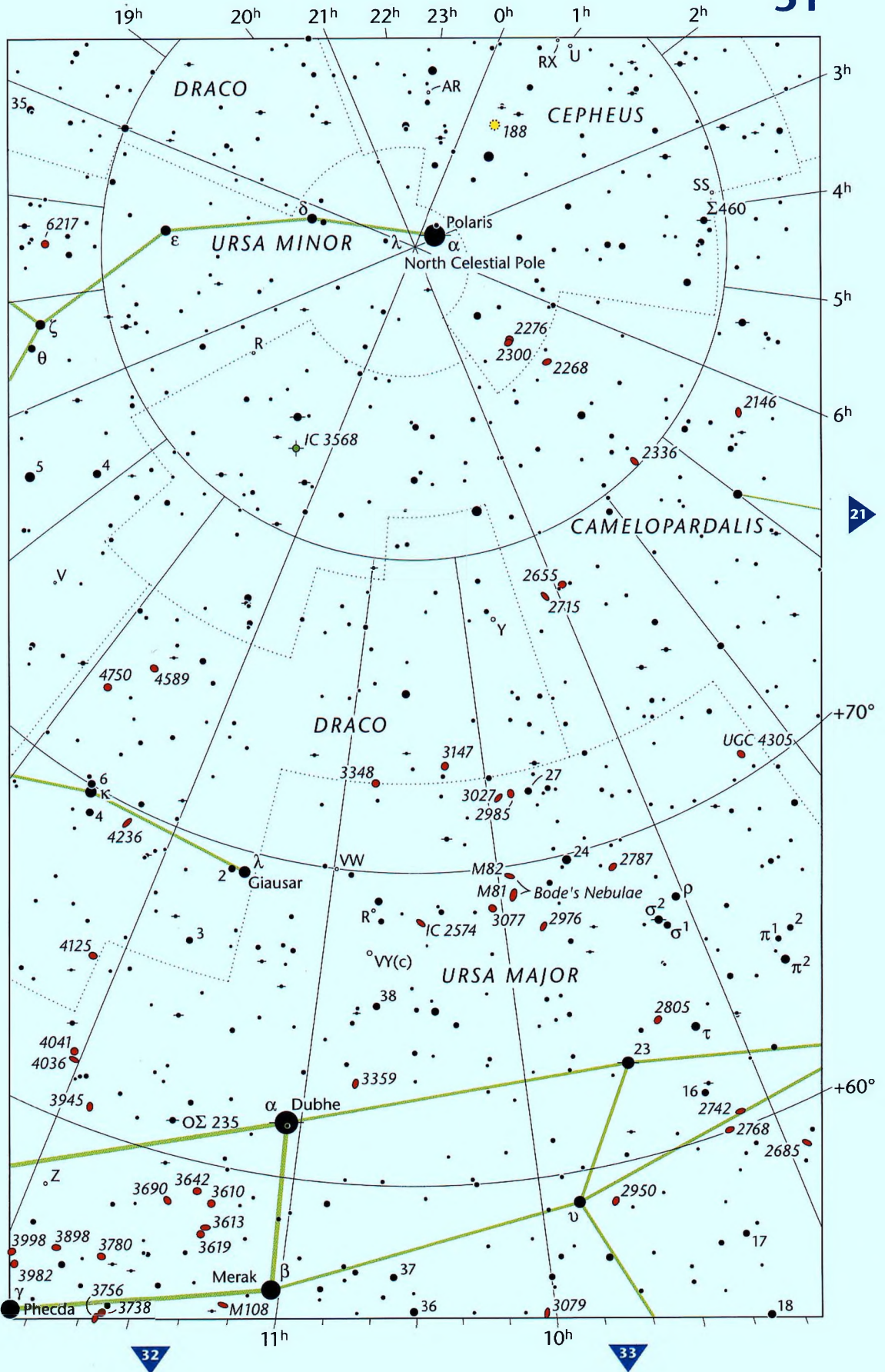
Dark nebulae

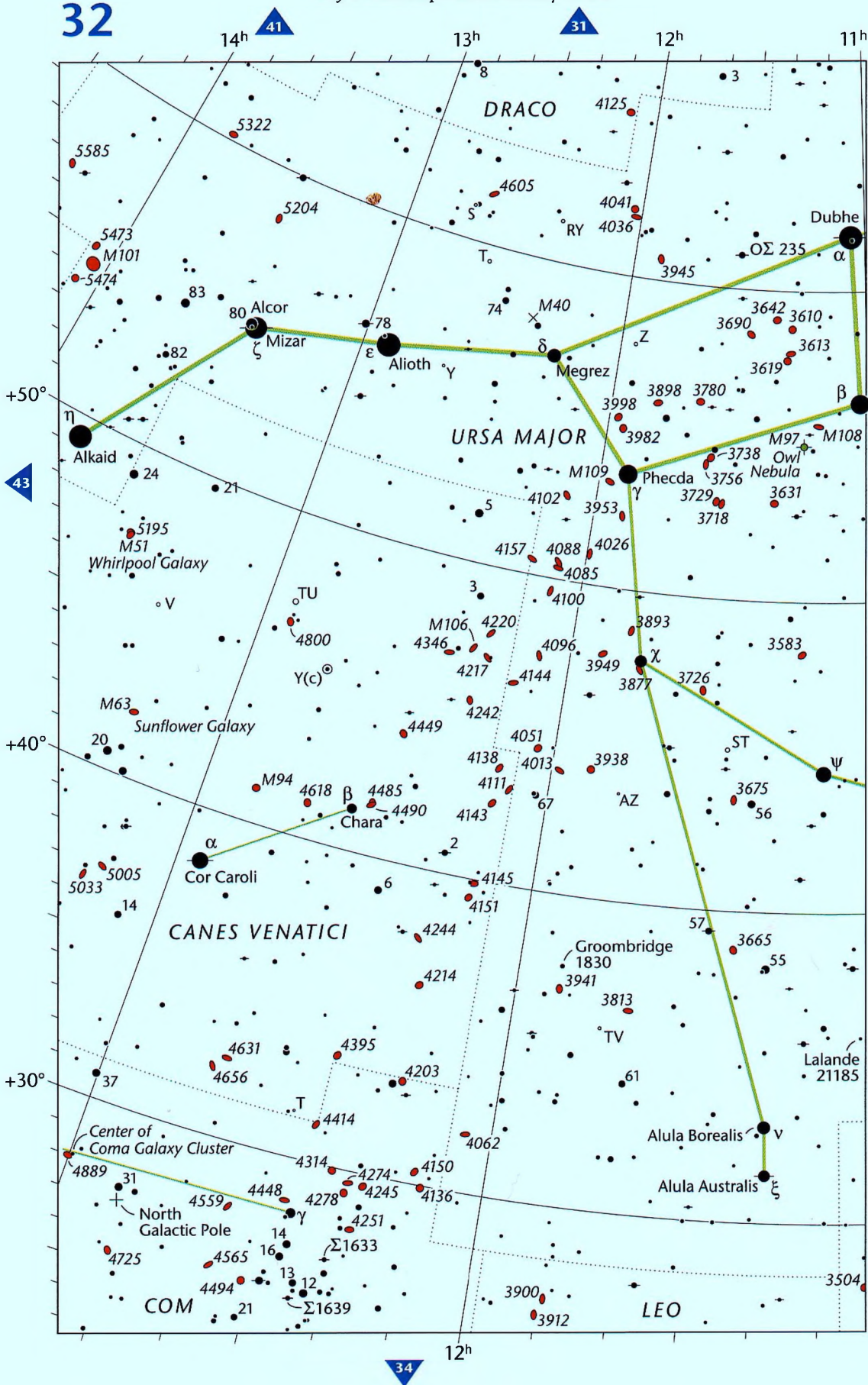
(to scale) <20'

Planetary nebulae

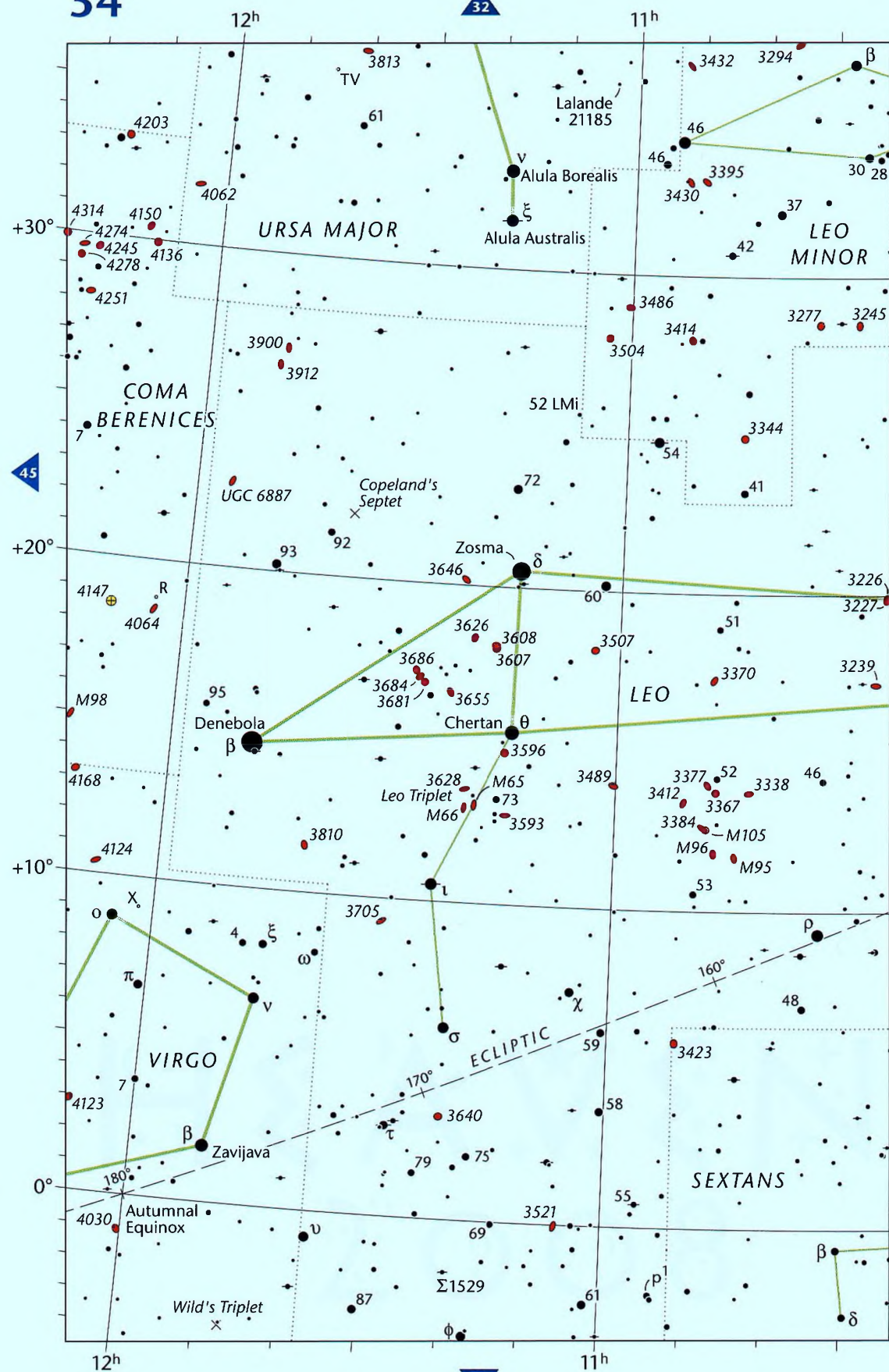
50' (to scale) <20'

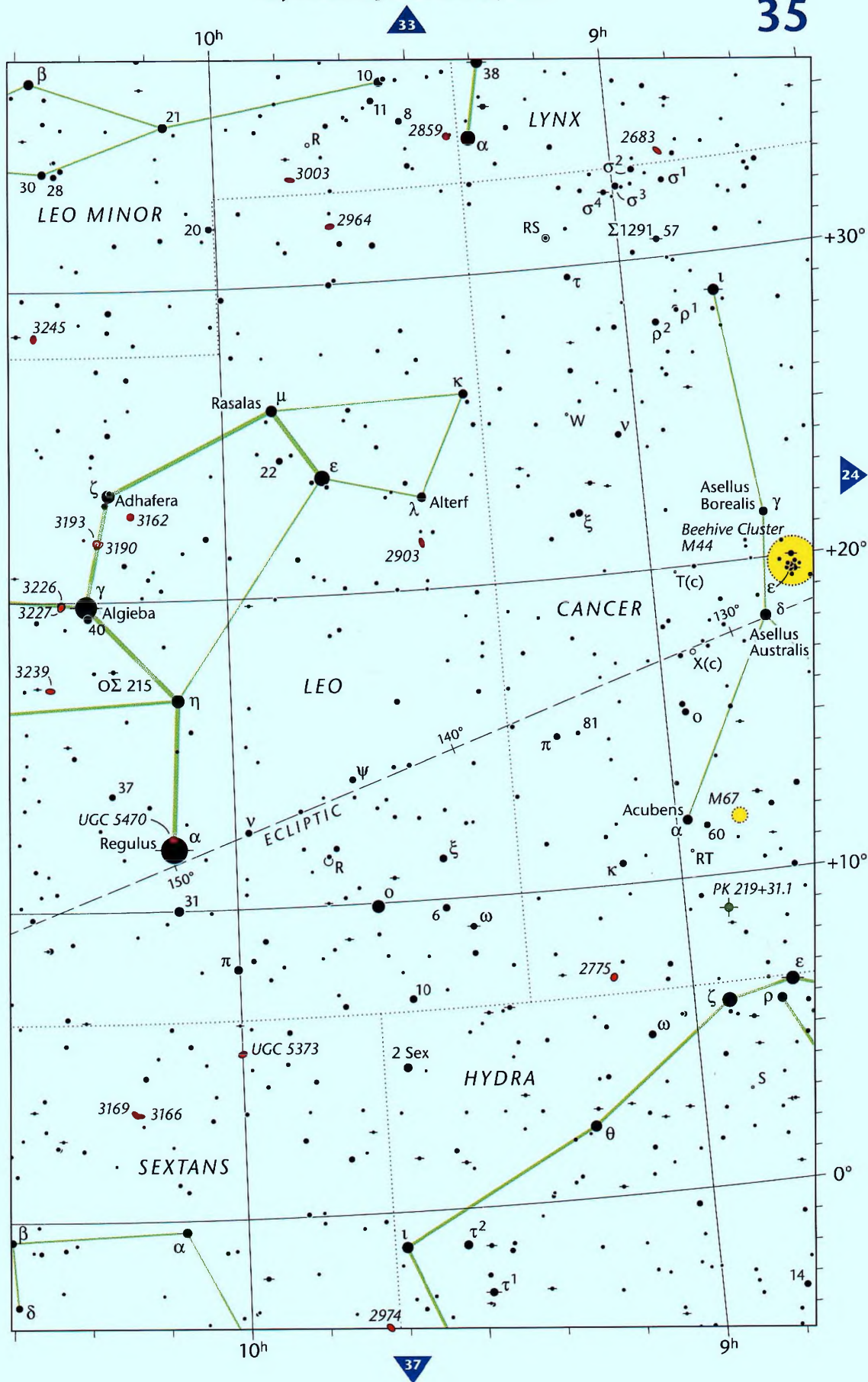


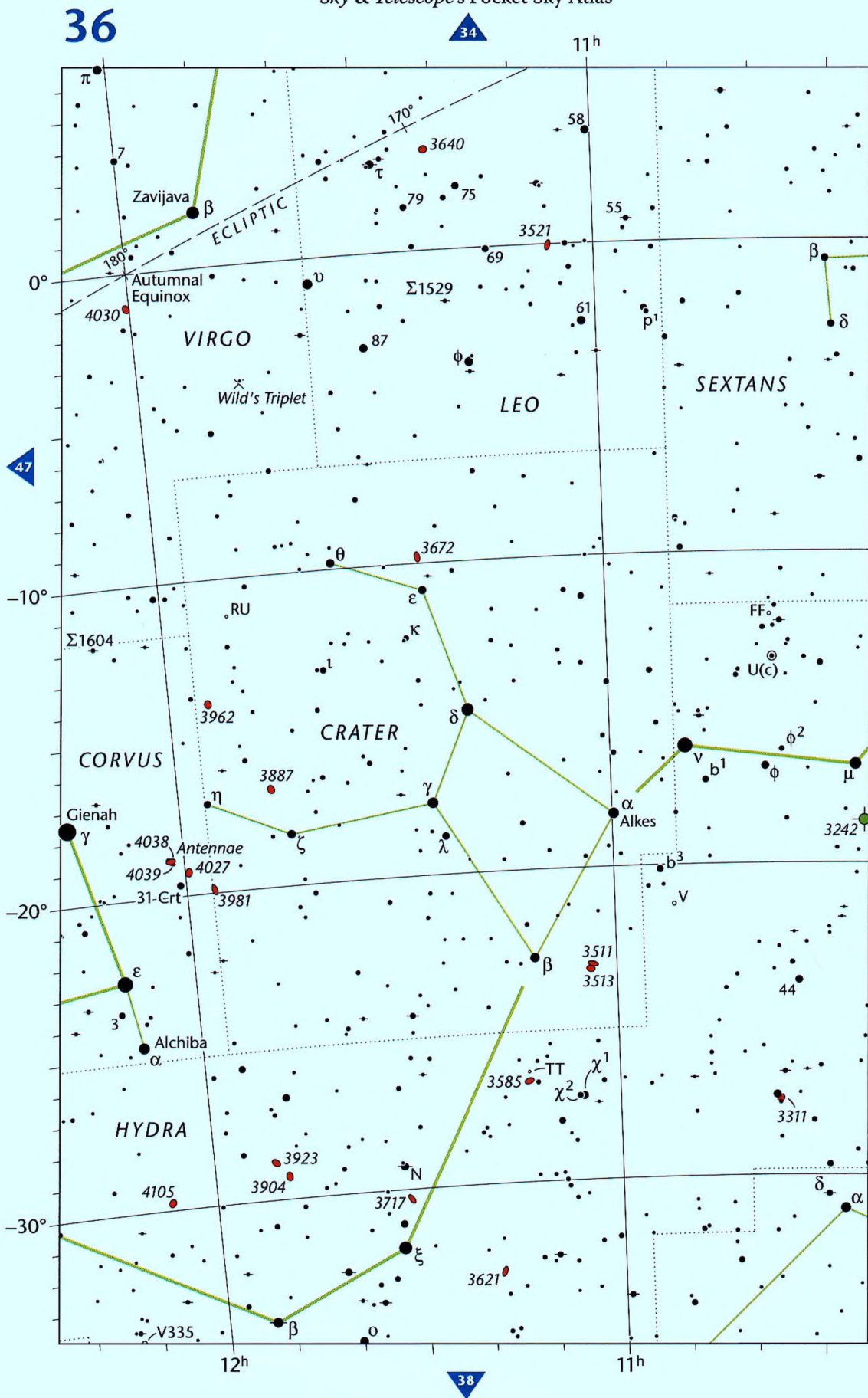




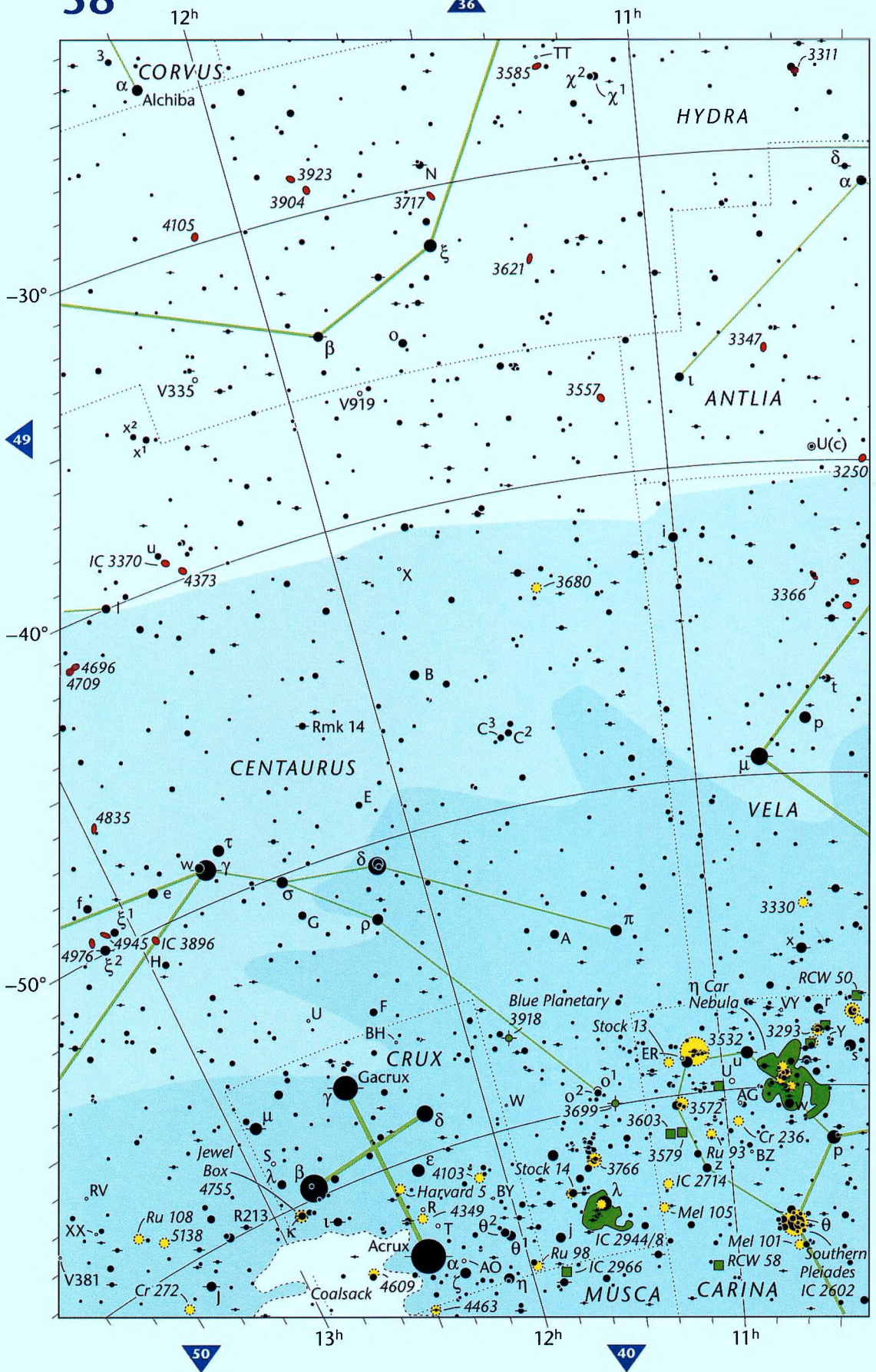


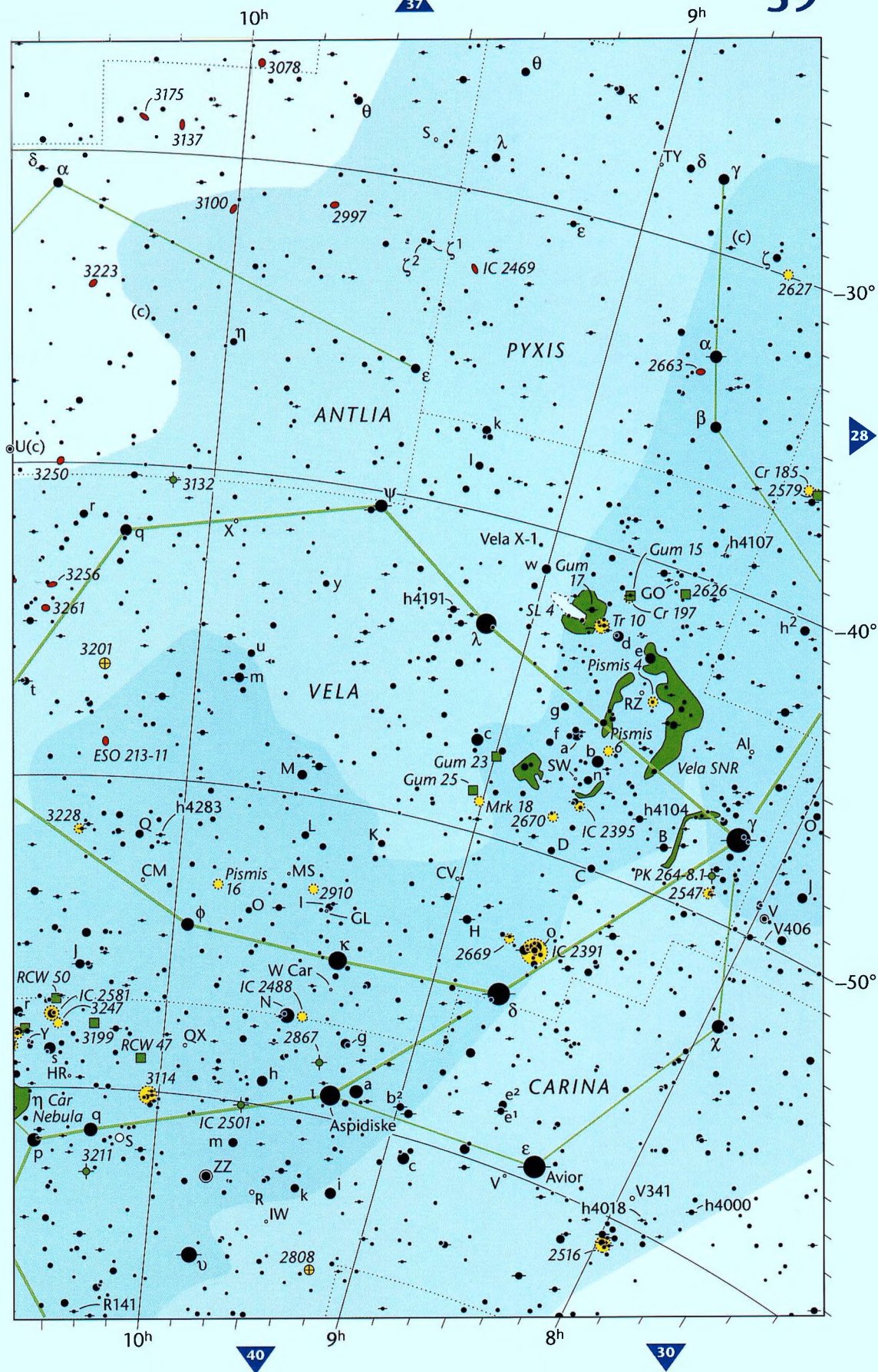


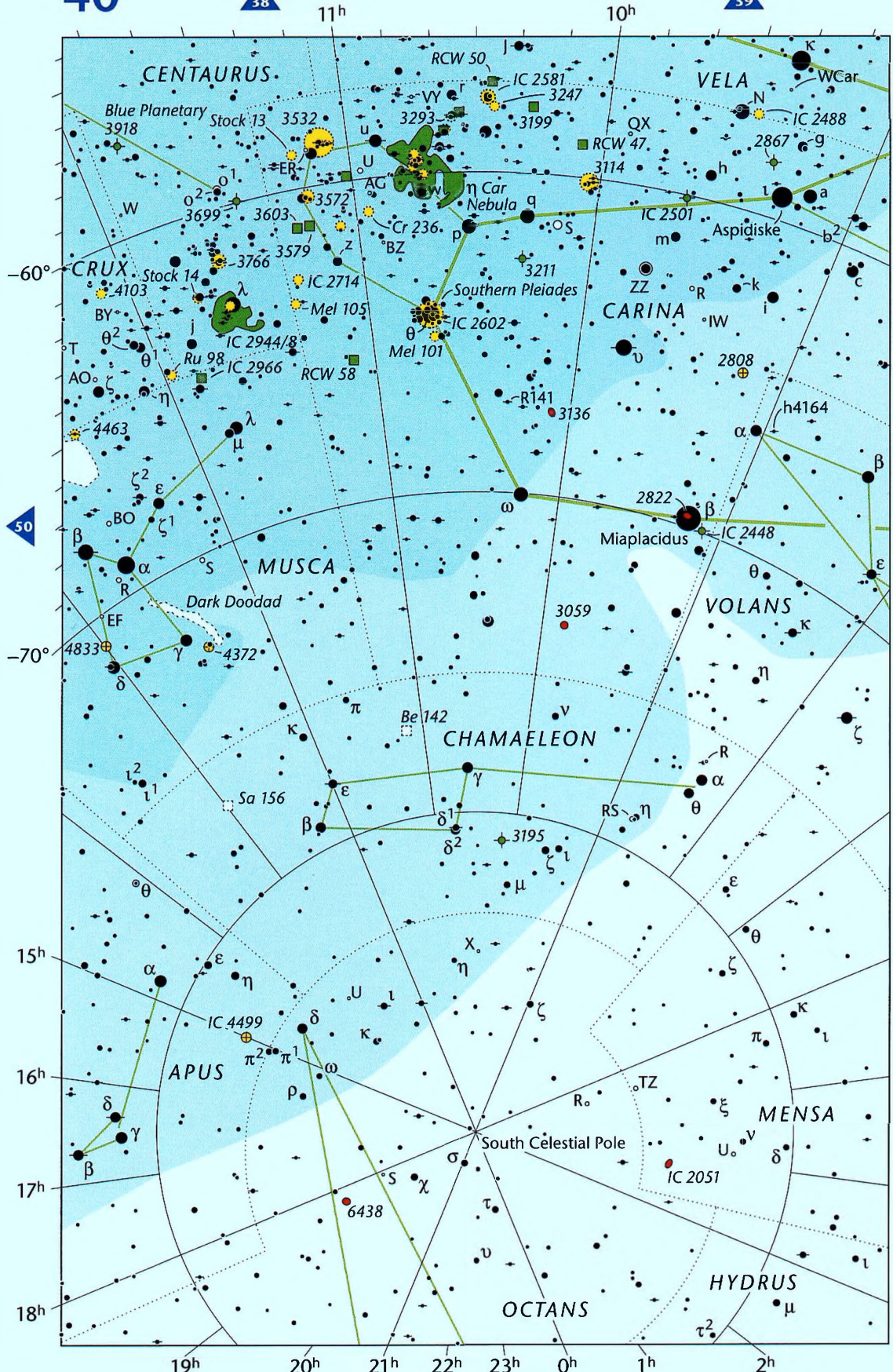












Charts 41-50

Right Ascension 12^h to 15^h

This section is highest in the night sky
around these times:

Evening: May & June

Midnight: April

Morning: February & March

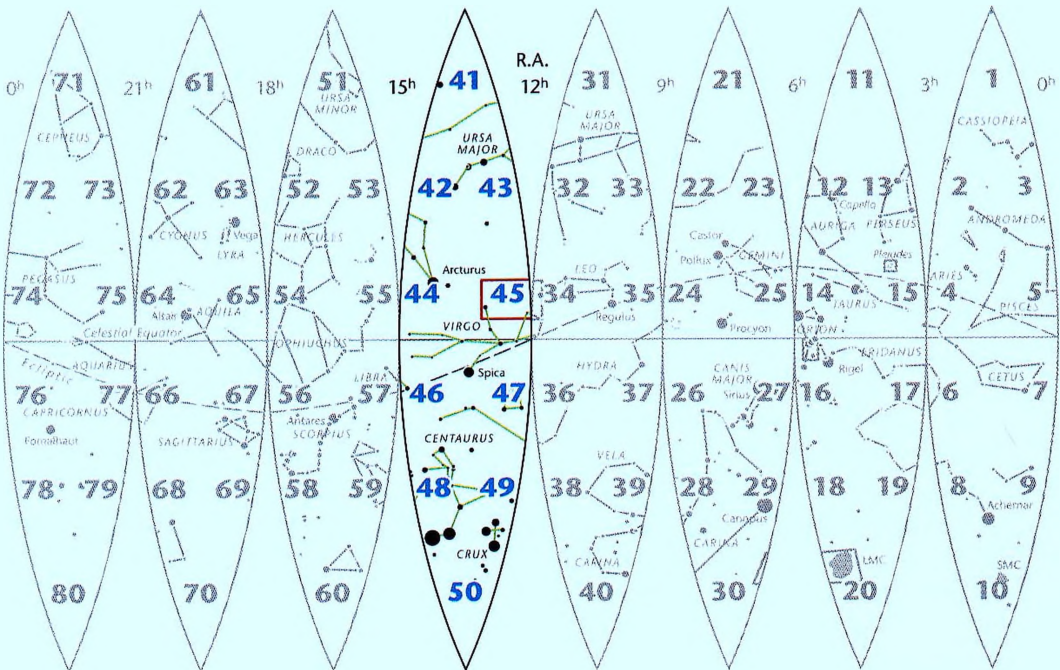


Chart Legend

● Double star

⊙ Variable stars

× Special object

+ Reference point

Open star clusters

50' (to scale) <20'

Globular clusters

50' (to scale) <20'

Galaxies

100' x 20' (to scale)

40' x 30' (to scale)

<20'

Bright nebulae

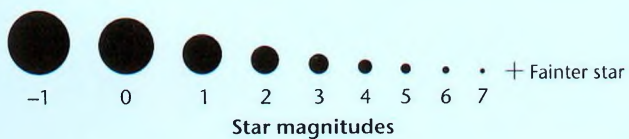
(to scale) <20'

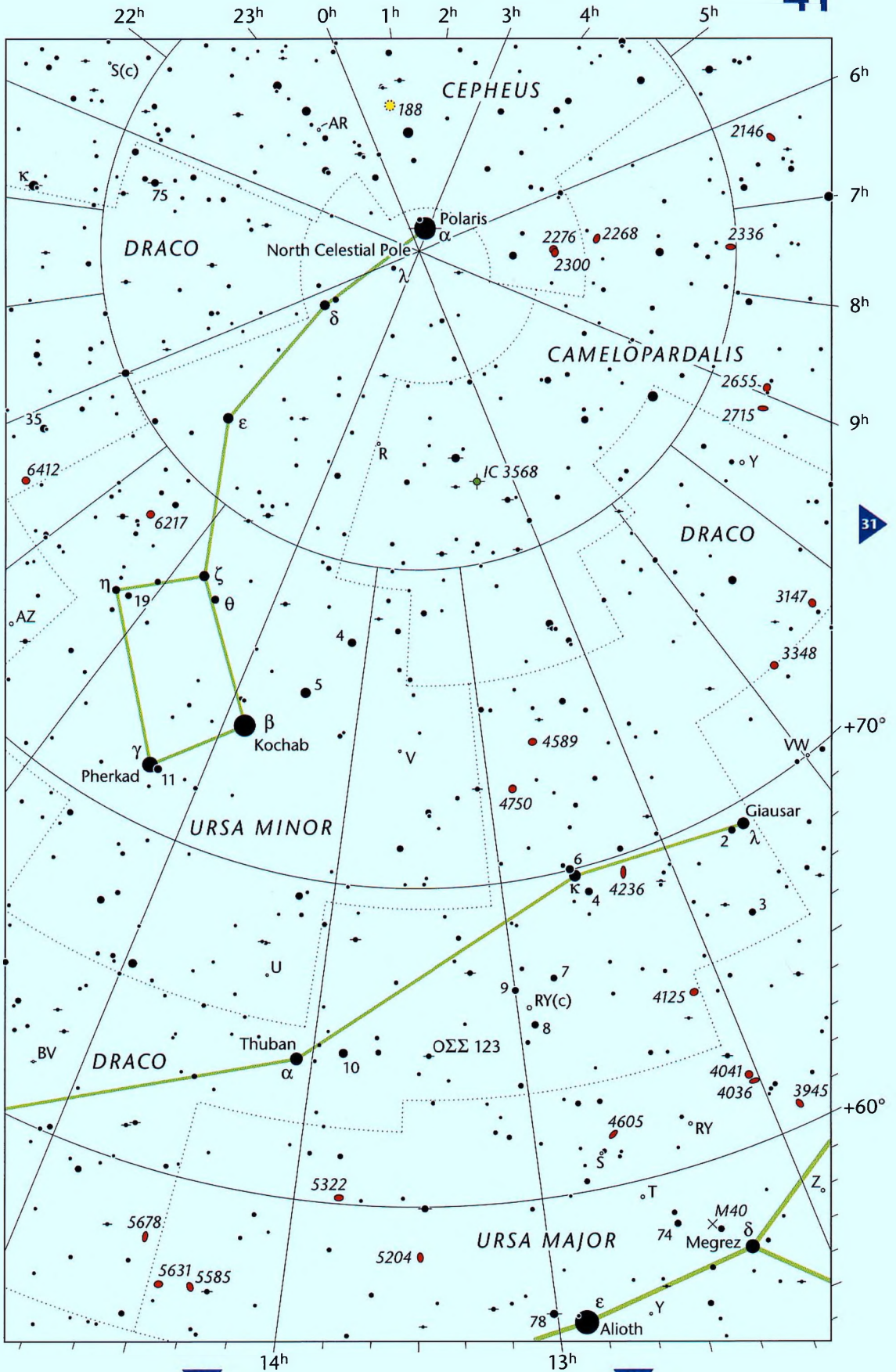
Dark nebulae

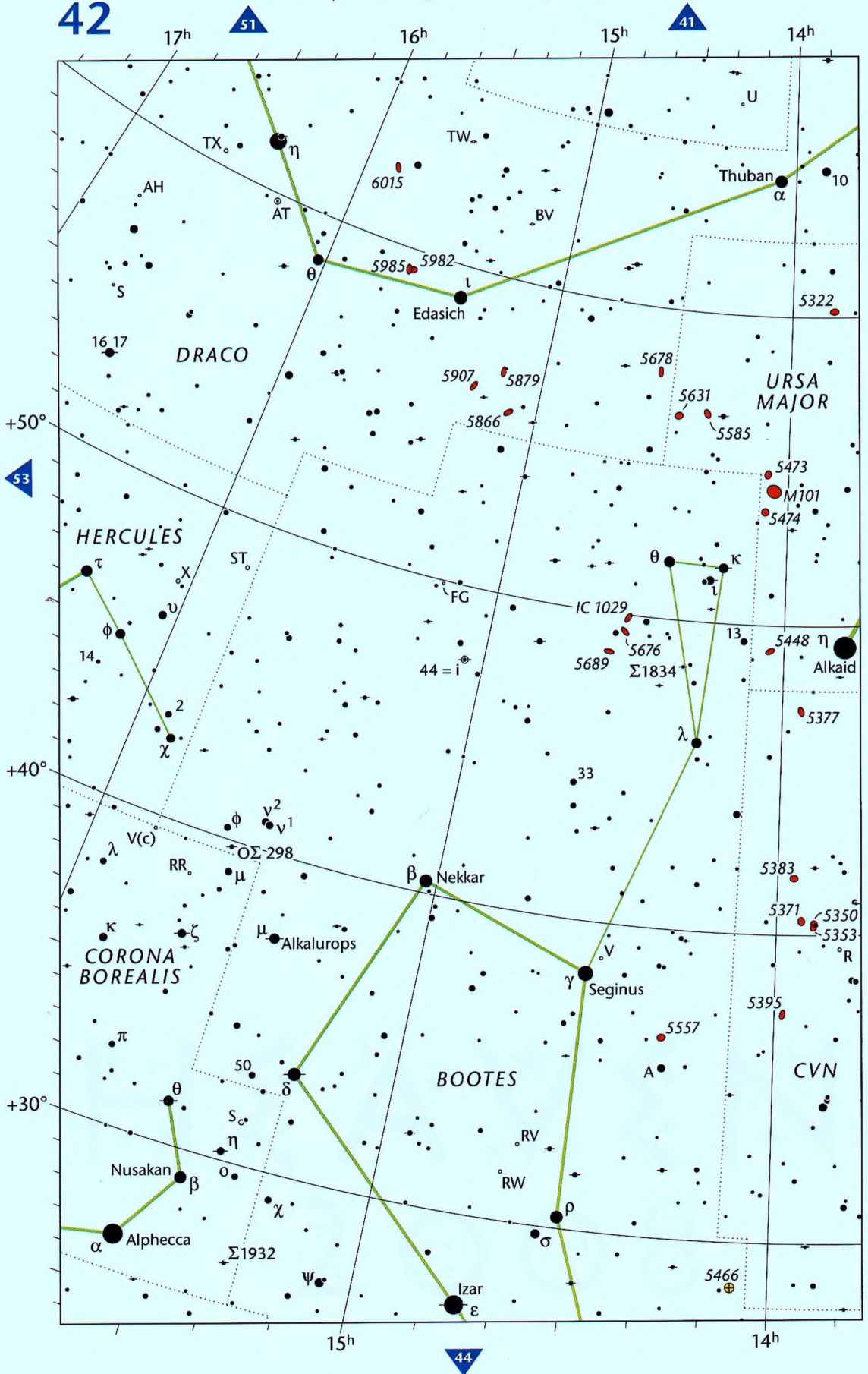
(to scale) <20'

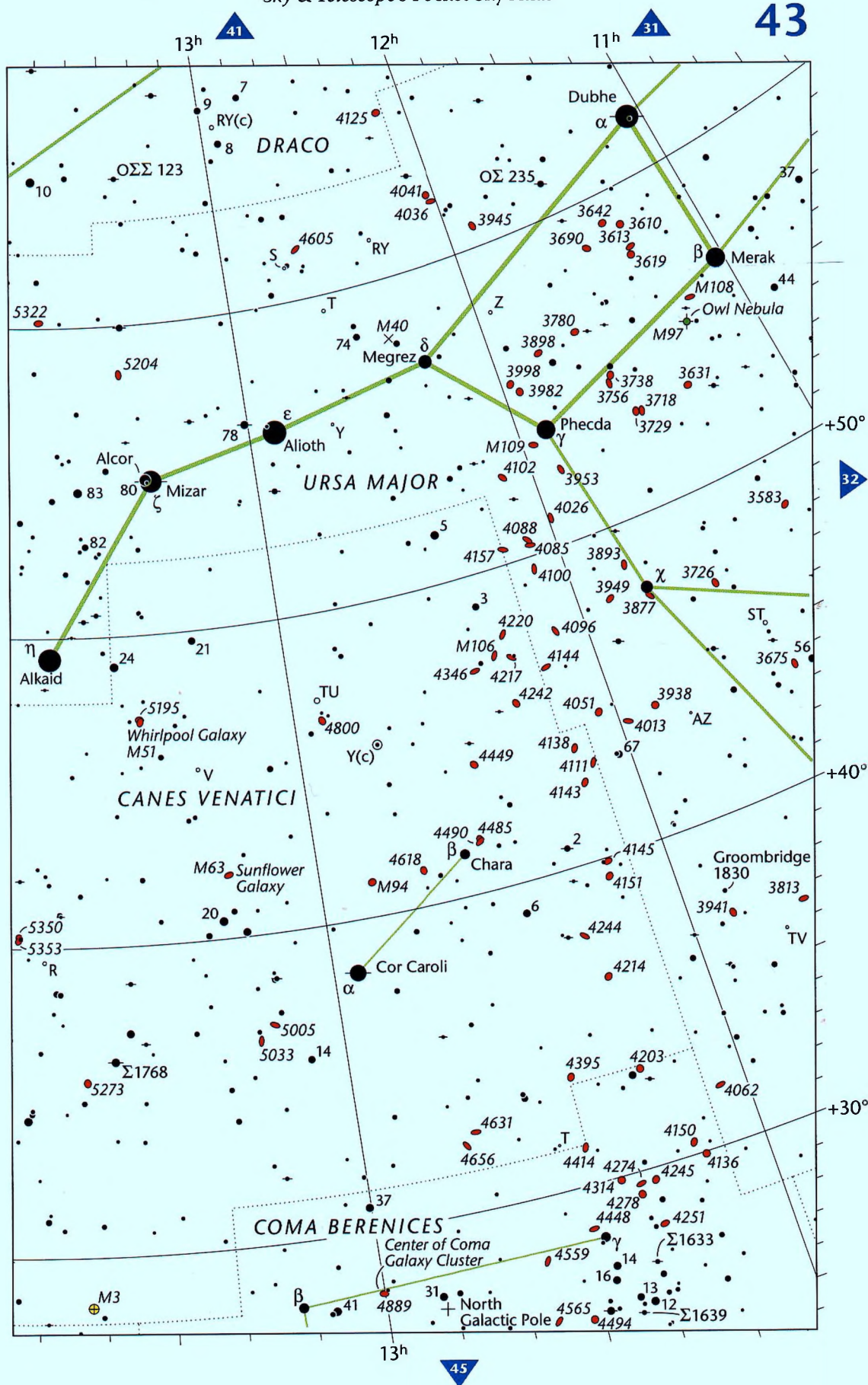
Planetary nebulae

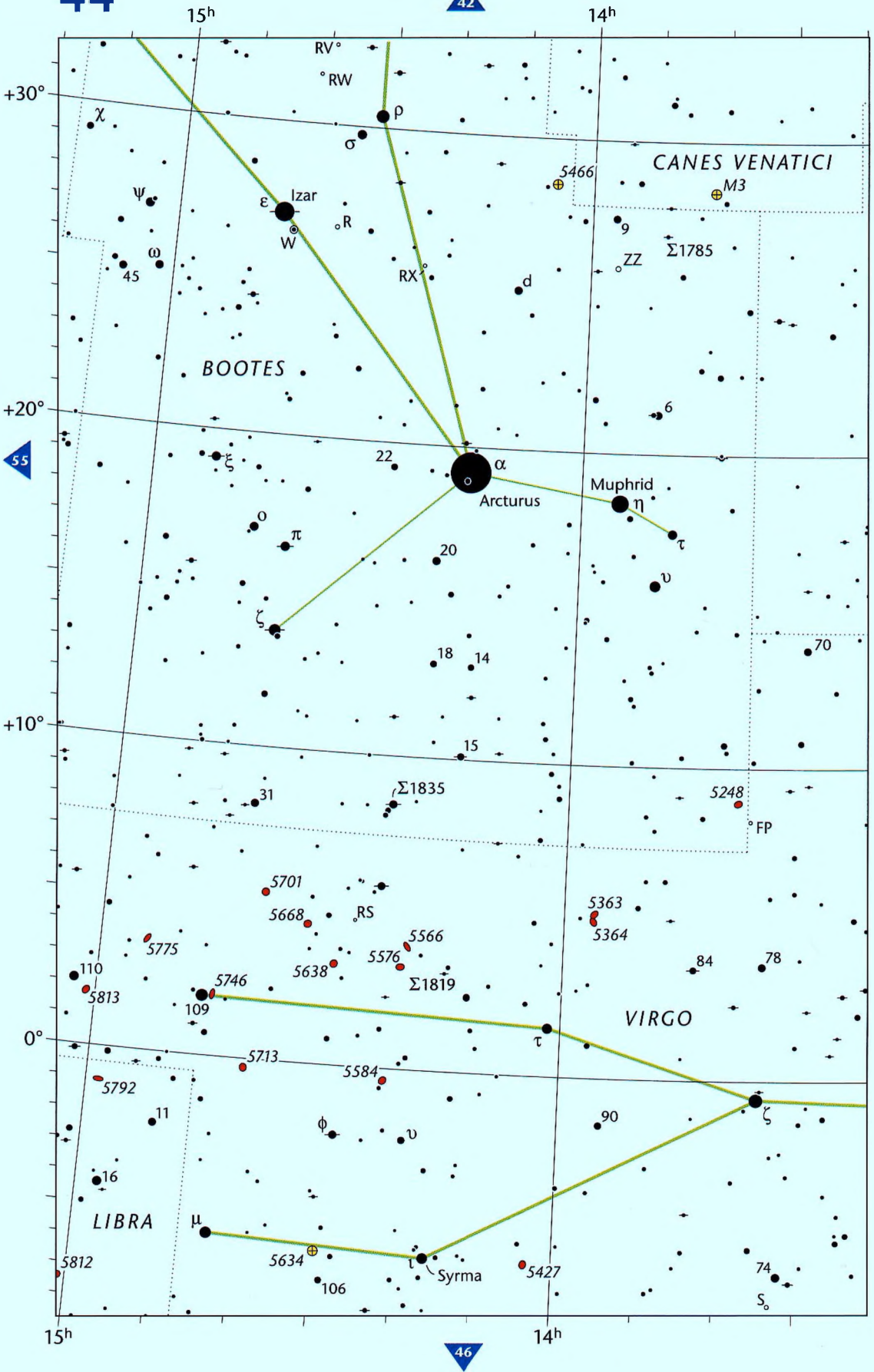
50' (to scale) <20'

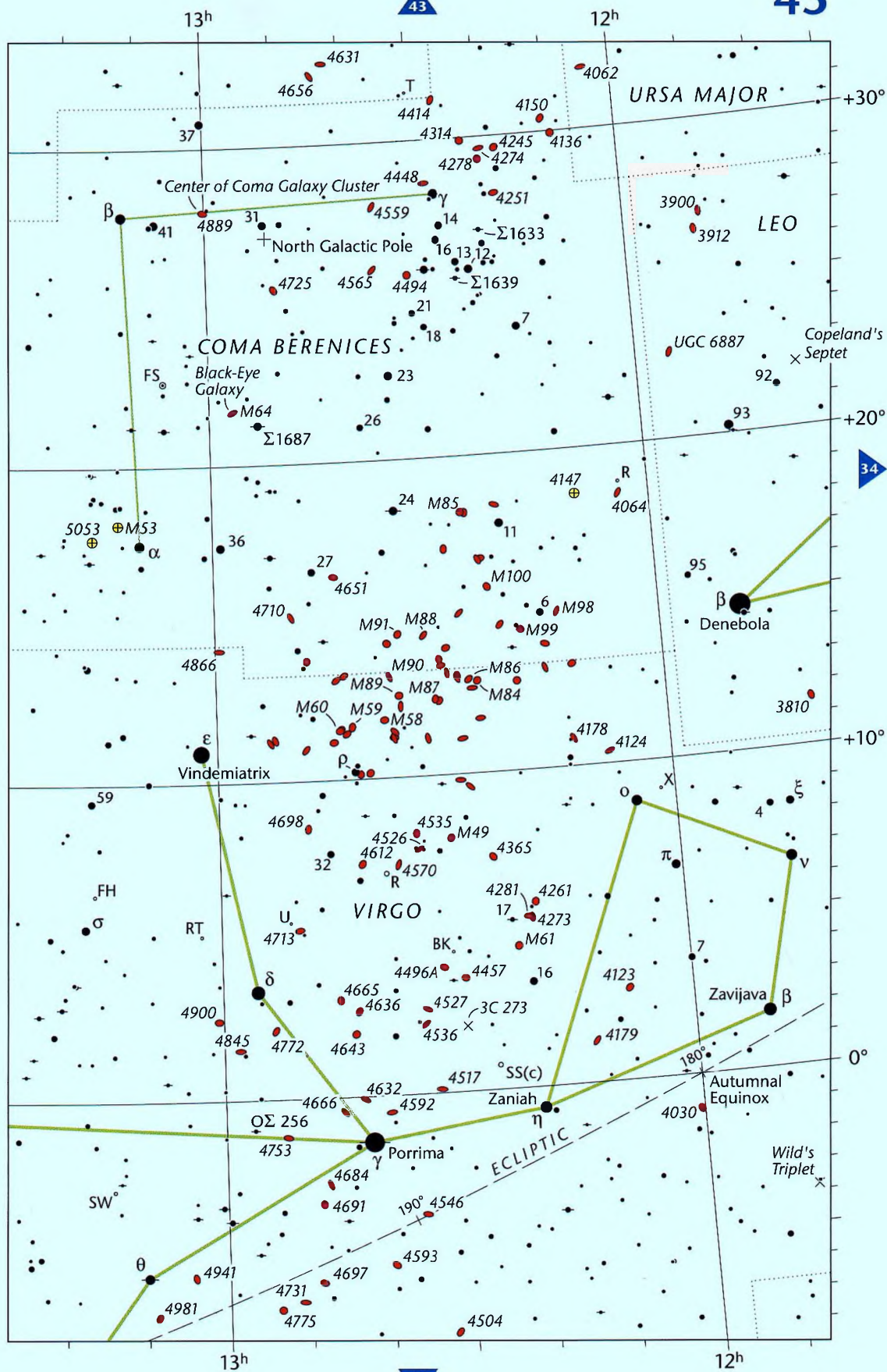


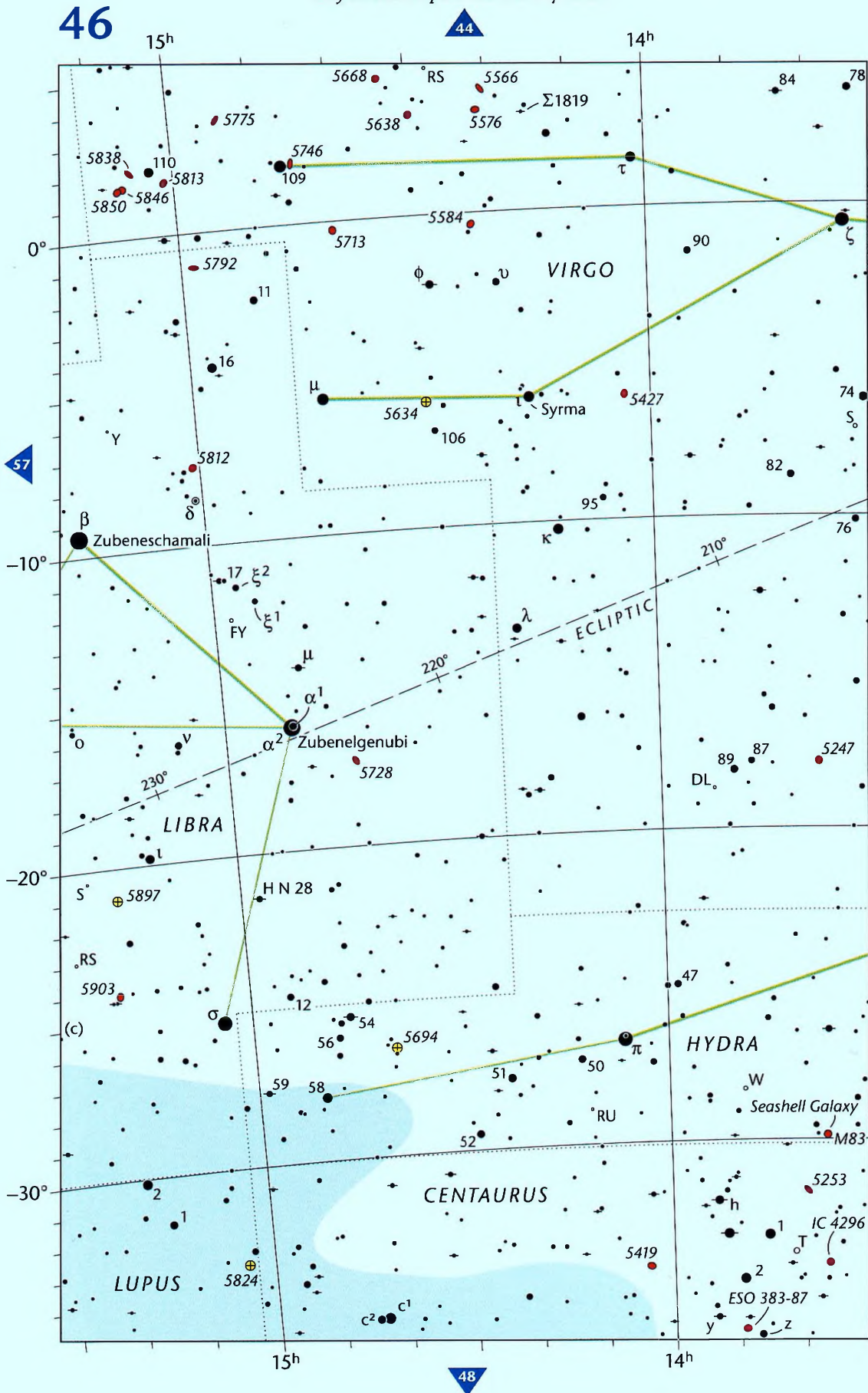


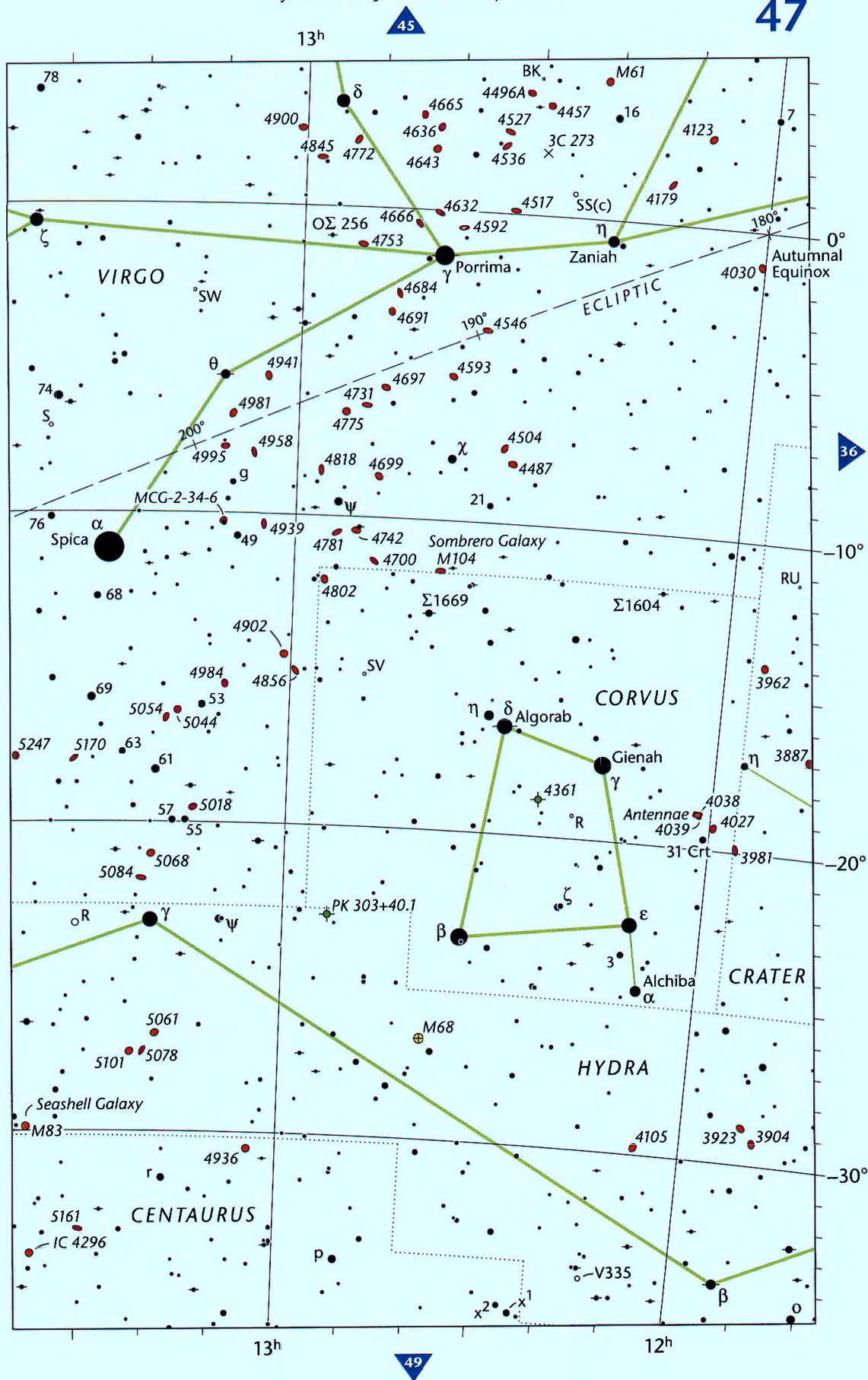


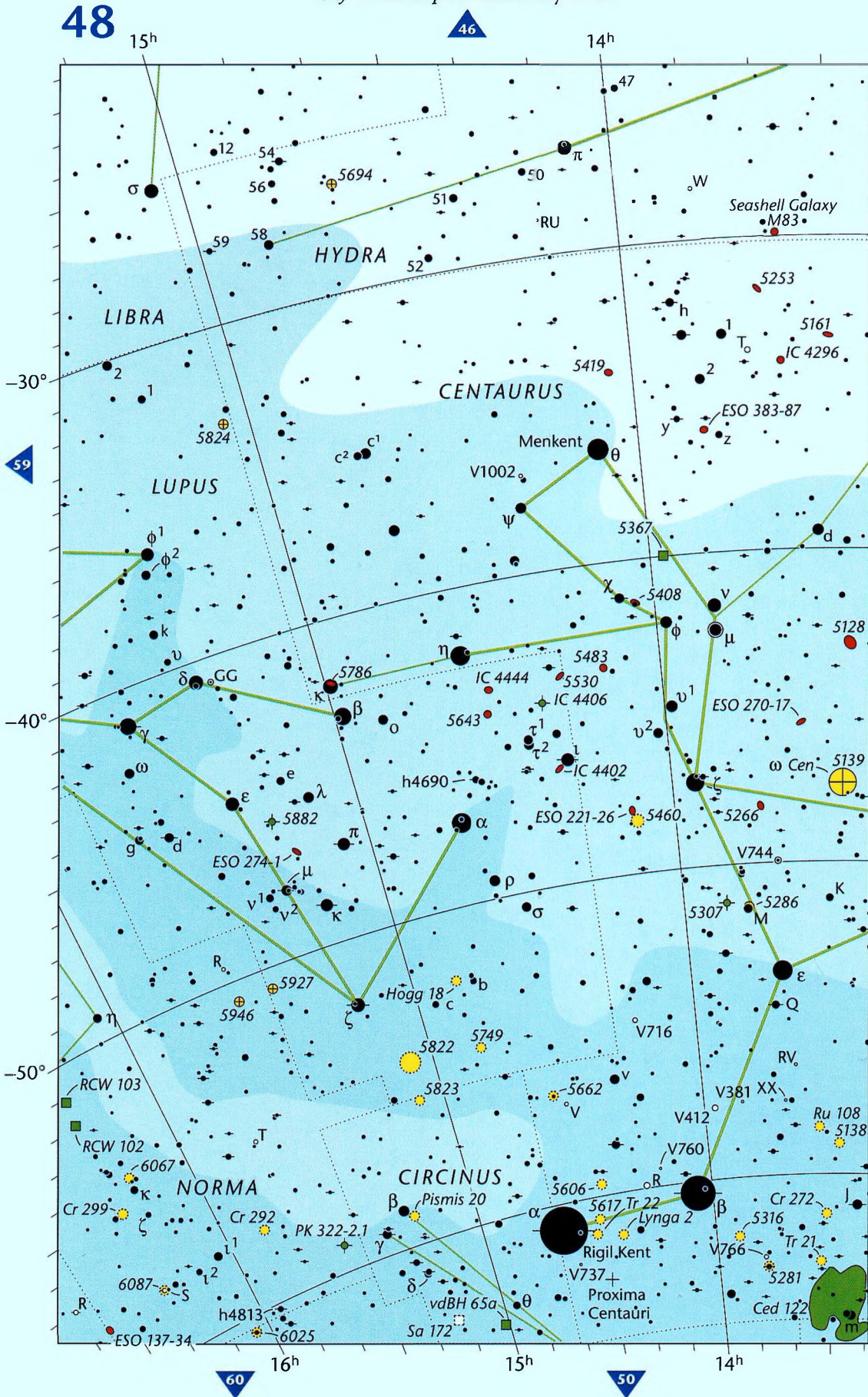




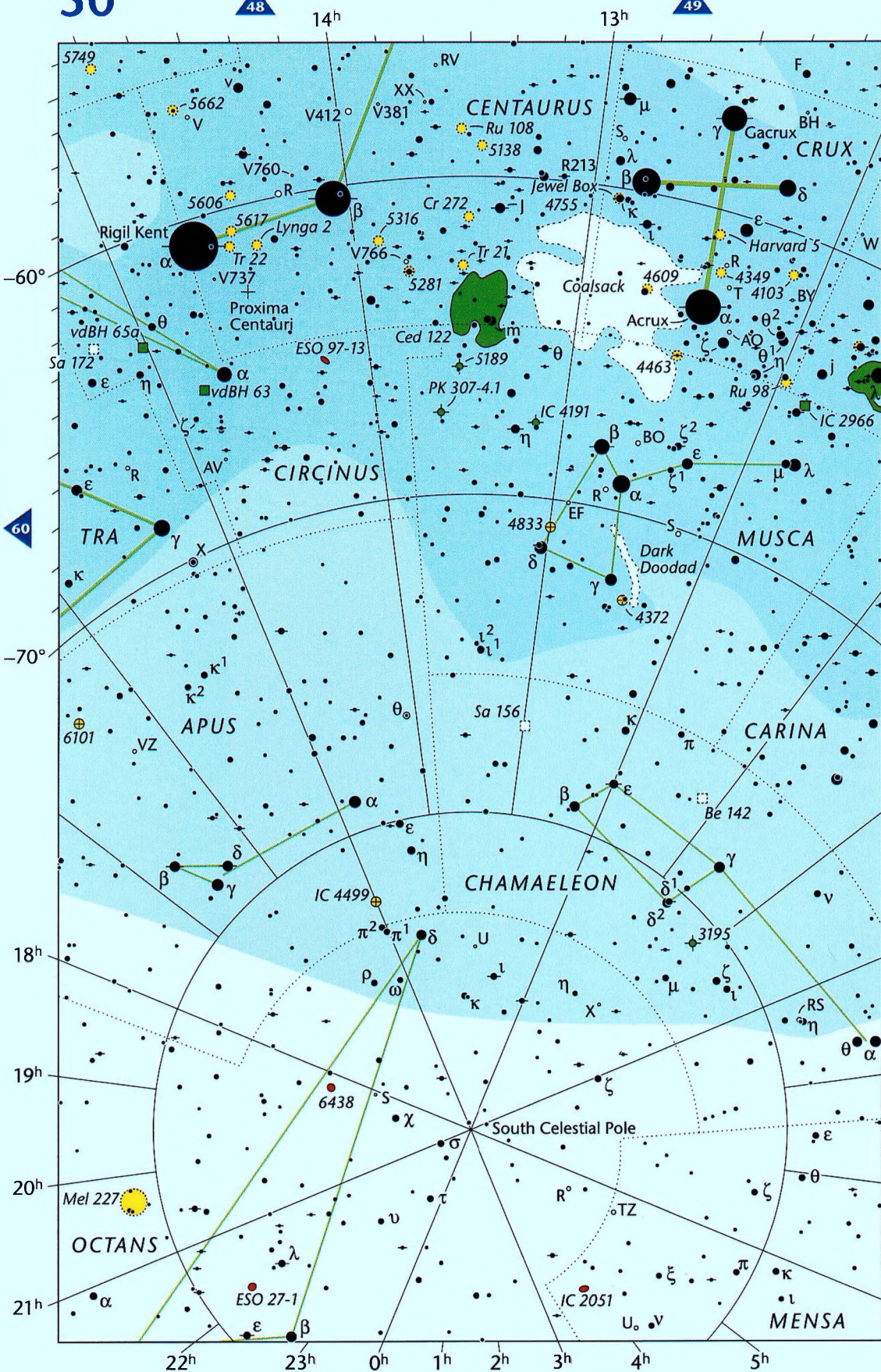












Charts 51–60

Right Ascension 15^h to 18^h

This section is highest in the night sky
around these times:

Evening: July

Midnight: May & June

Morning: April

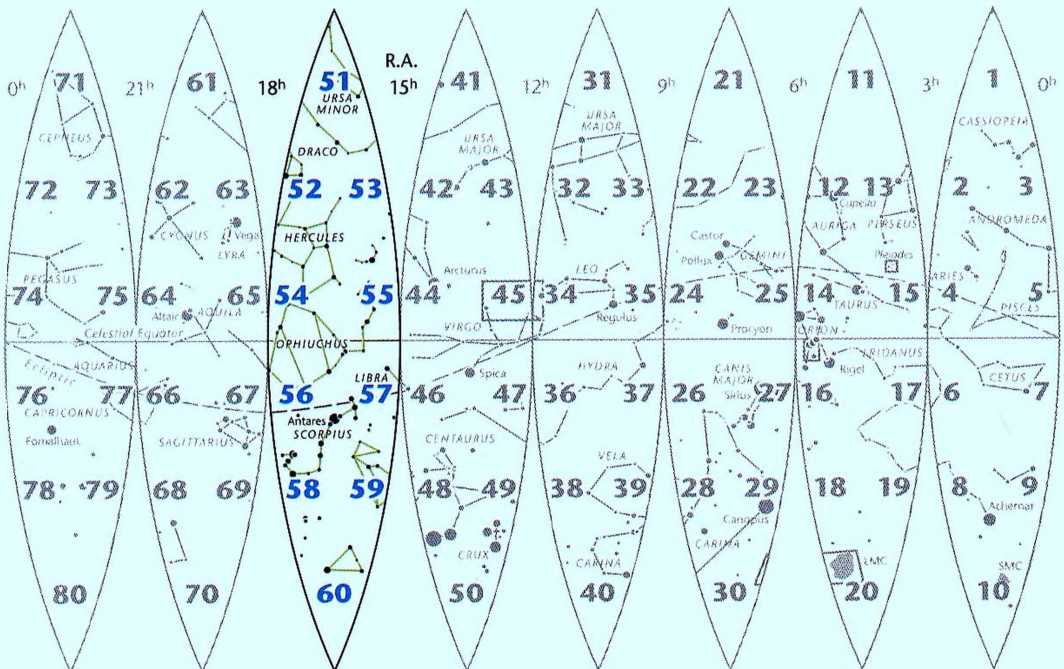


Chart Legend

● Double star

⊙ Variable stars
○

× Special object

+ Reference point

Open star clusters

 50' (to scale)  <20'

Globular clusters

 50' (to scale)  <20'

Galaxies

 100' x 20' (to scale)

 40' x 30' (to scale)

 <20'

Bright nebulae

 (to scale)  <20'

Dark nebulae

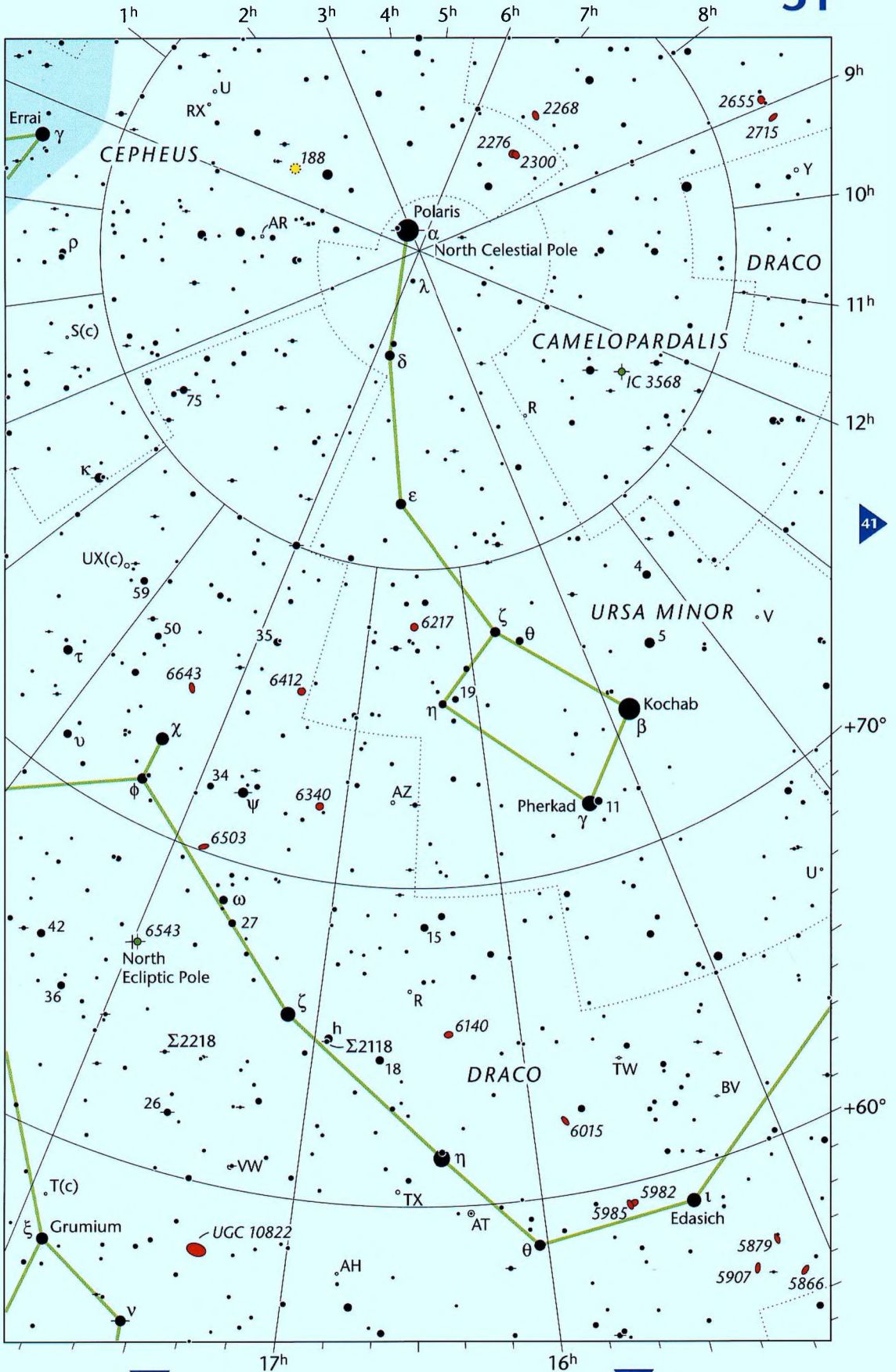
 (to scale)  <20'

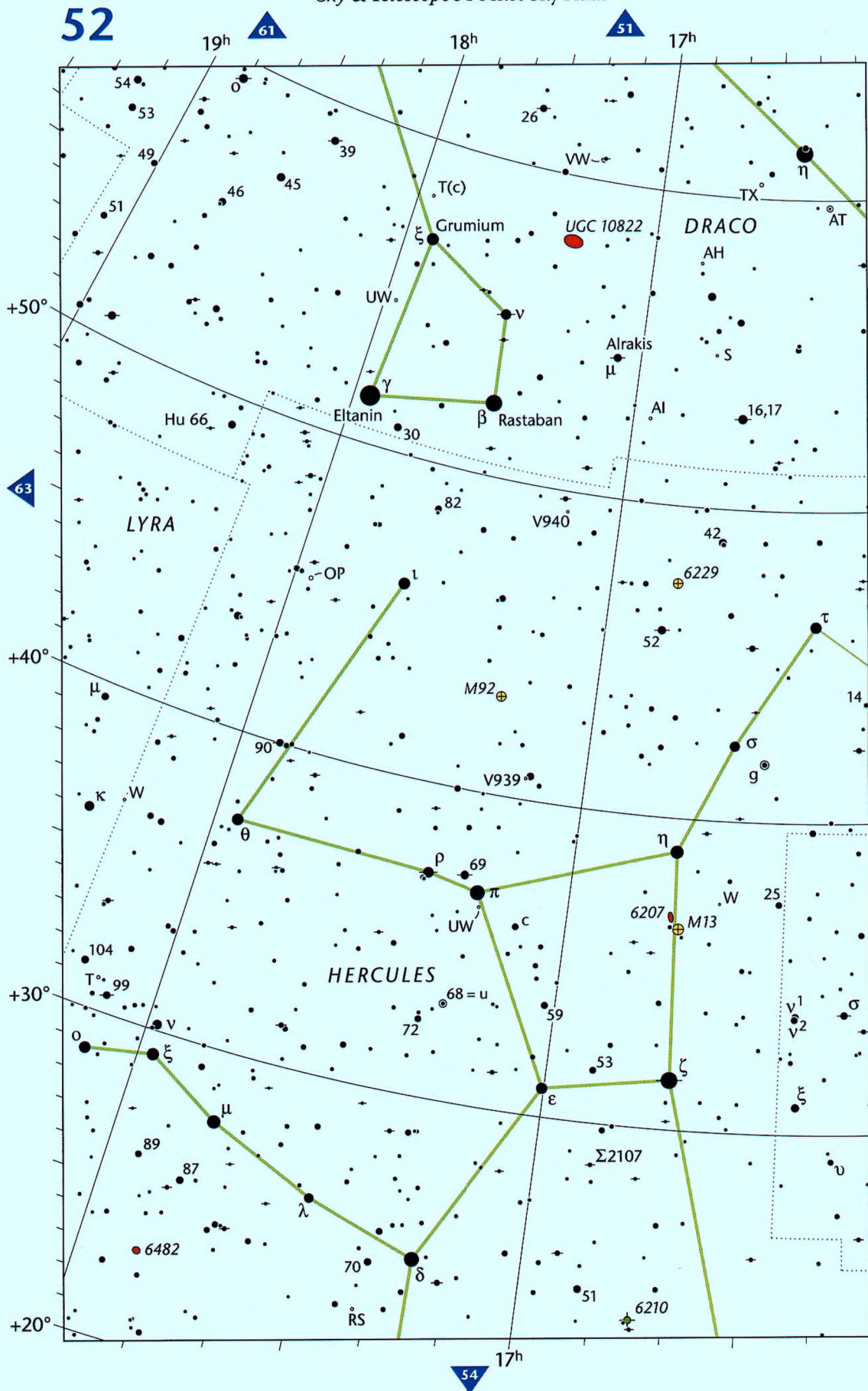
Planetary nebulae

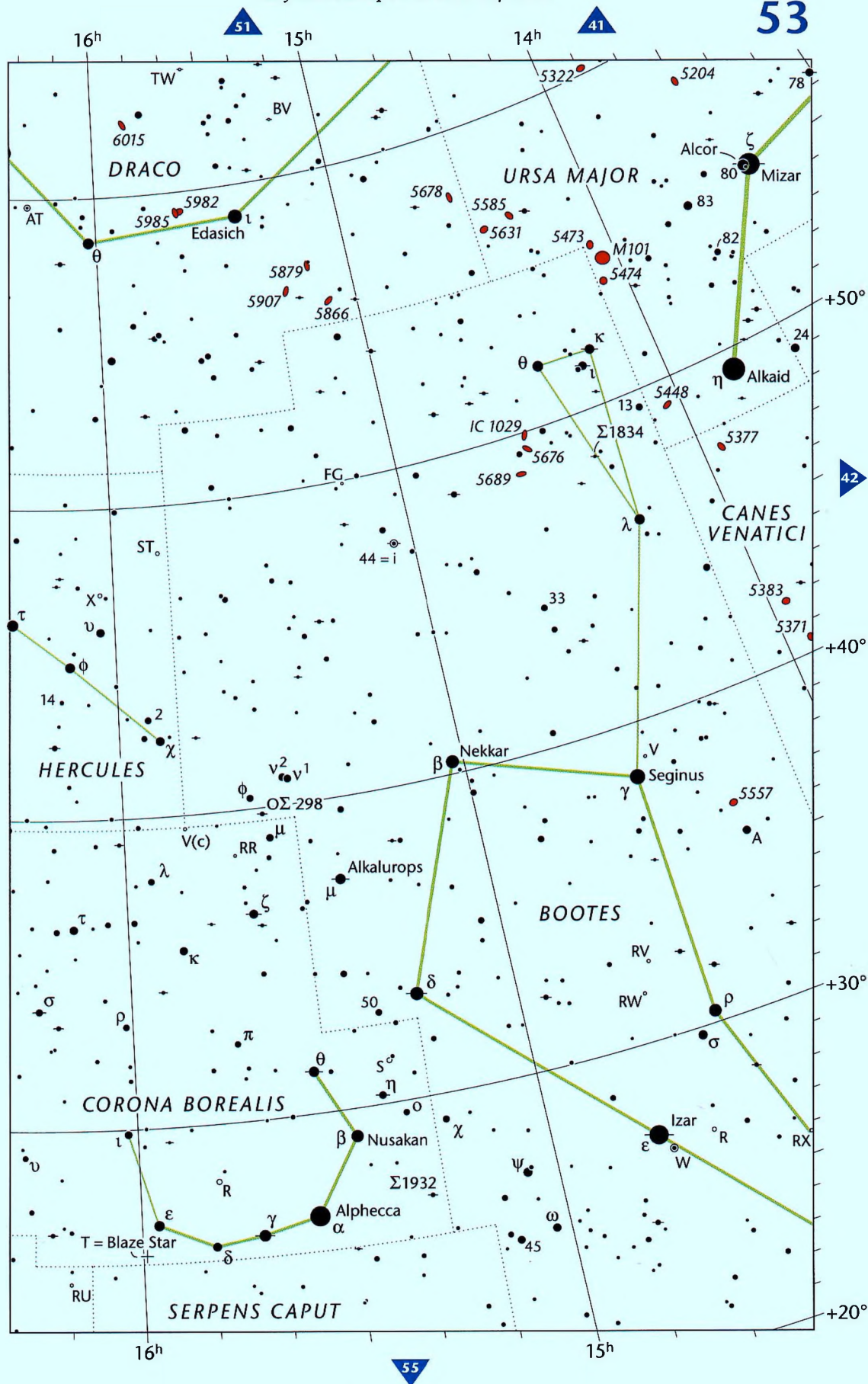
 50' (to scale)  <20'

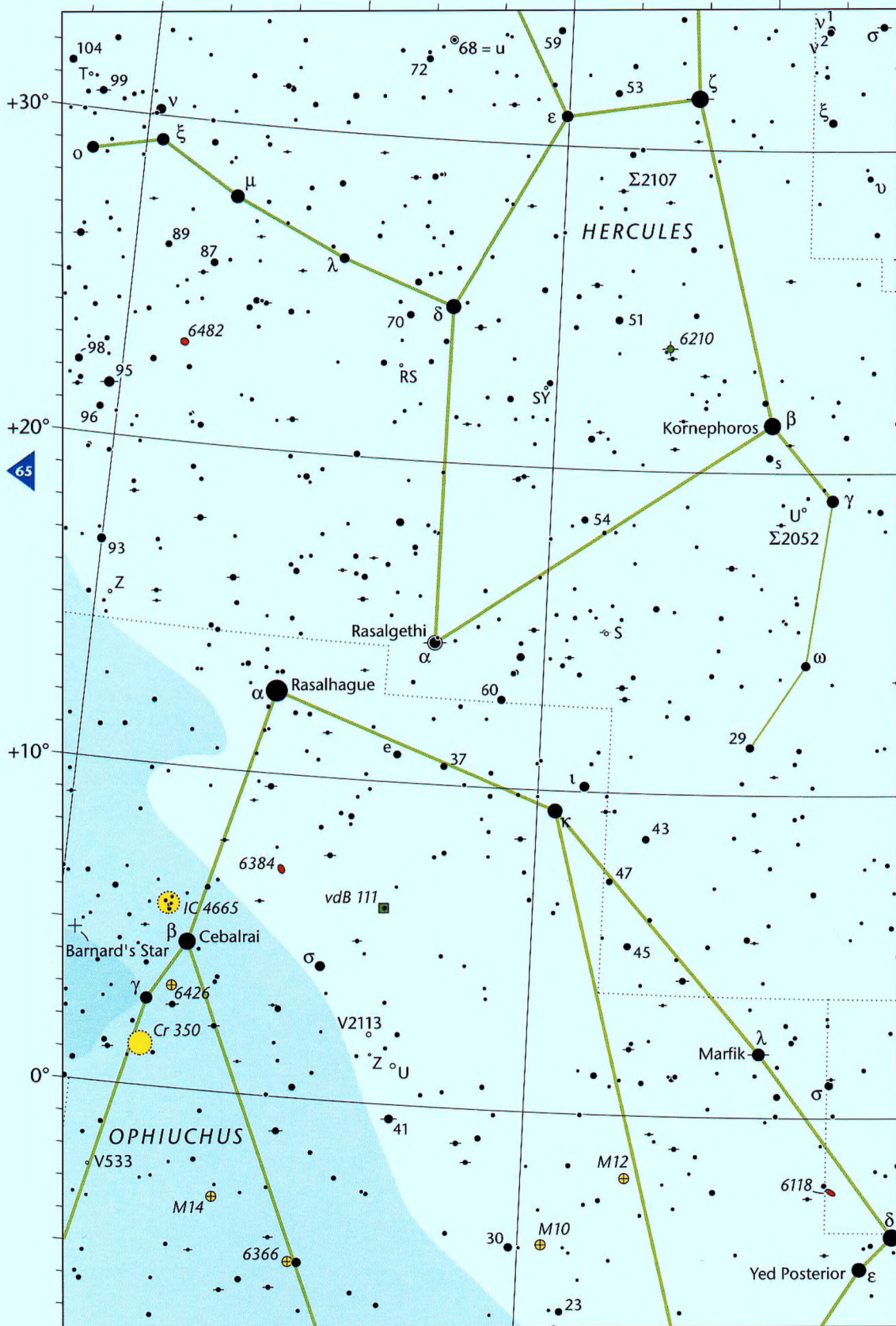
 -1  0  1  2  3  4  5  6  7 + Fainter star

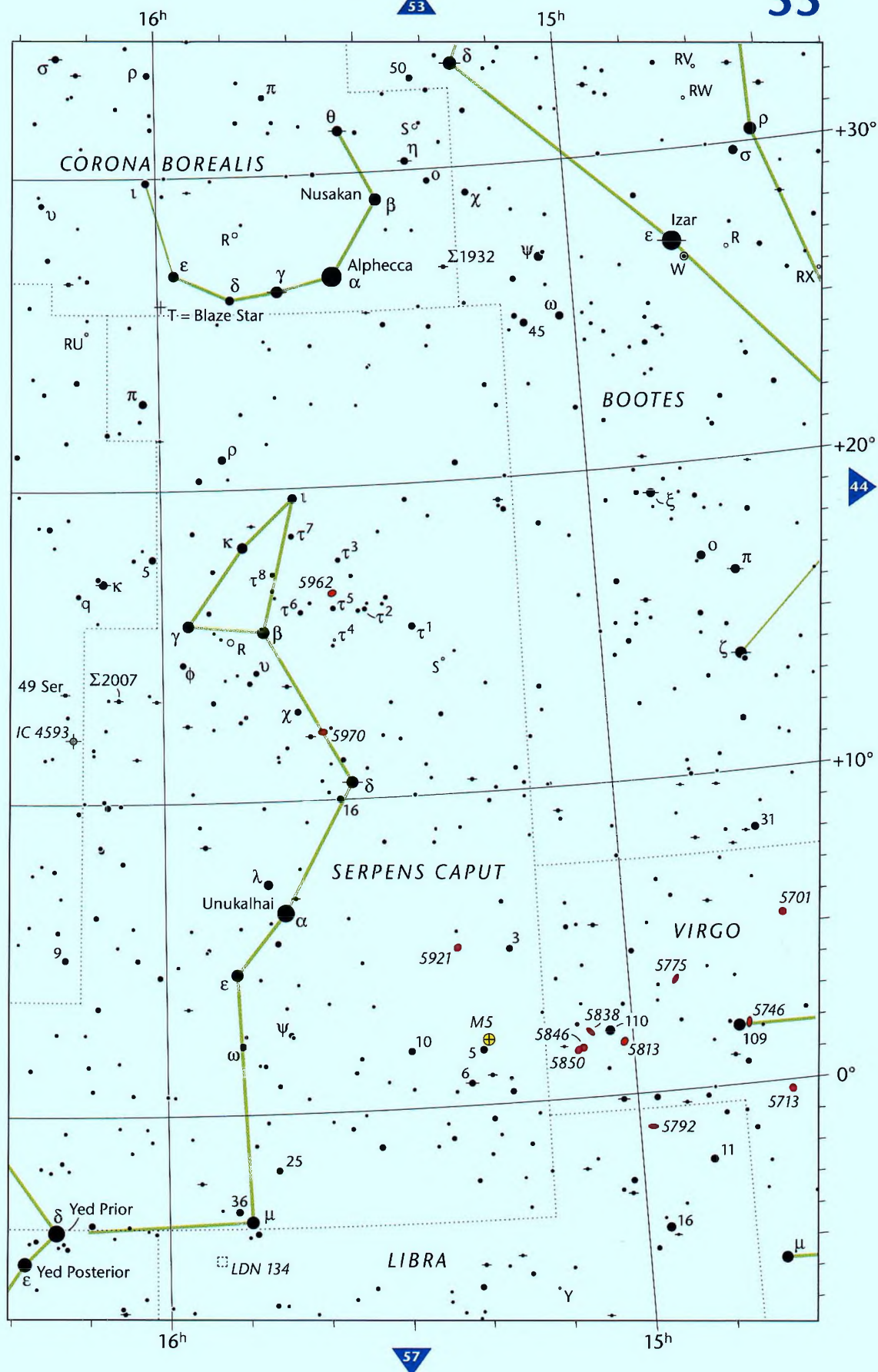
Star magnitudes

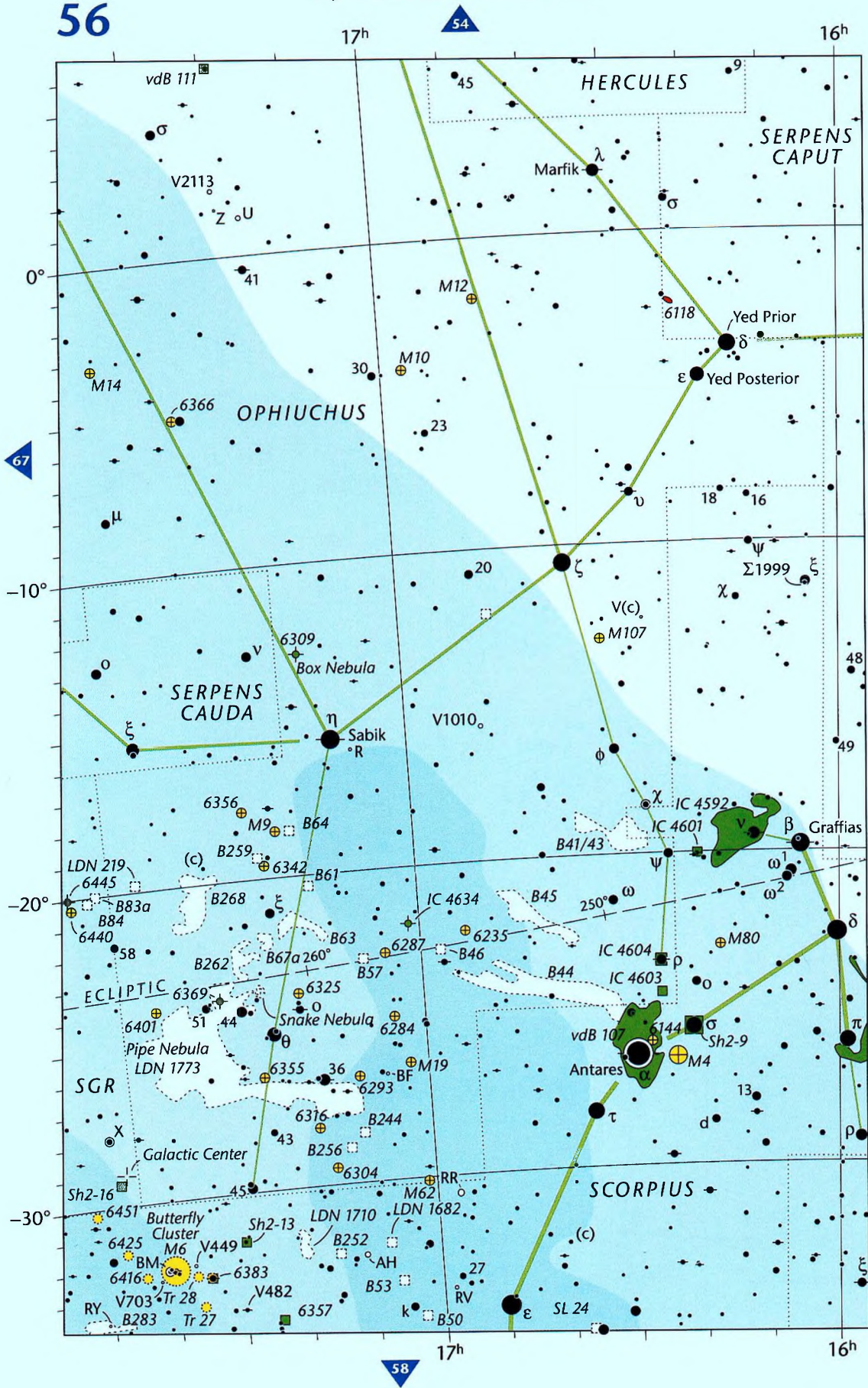


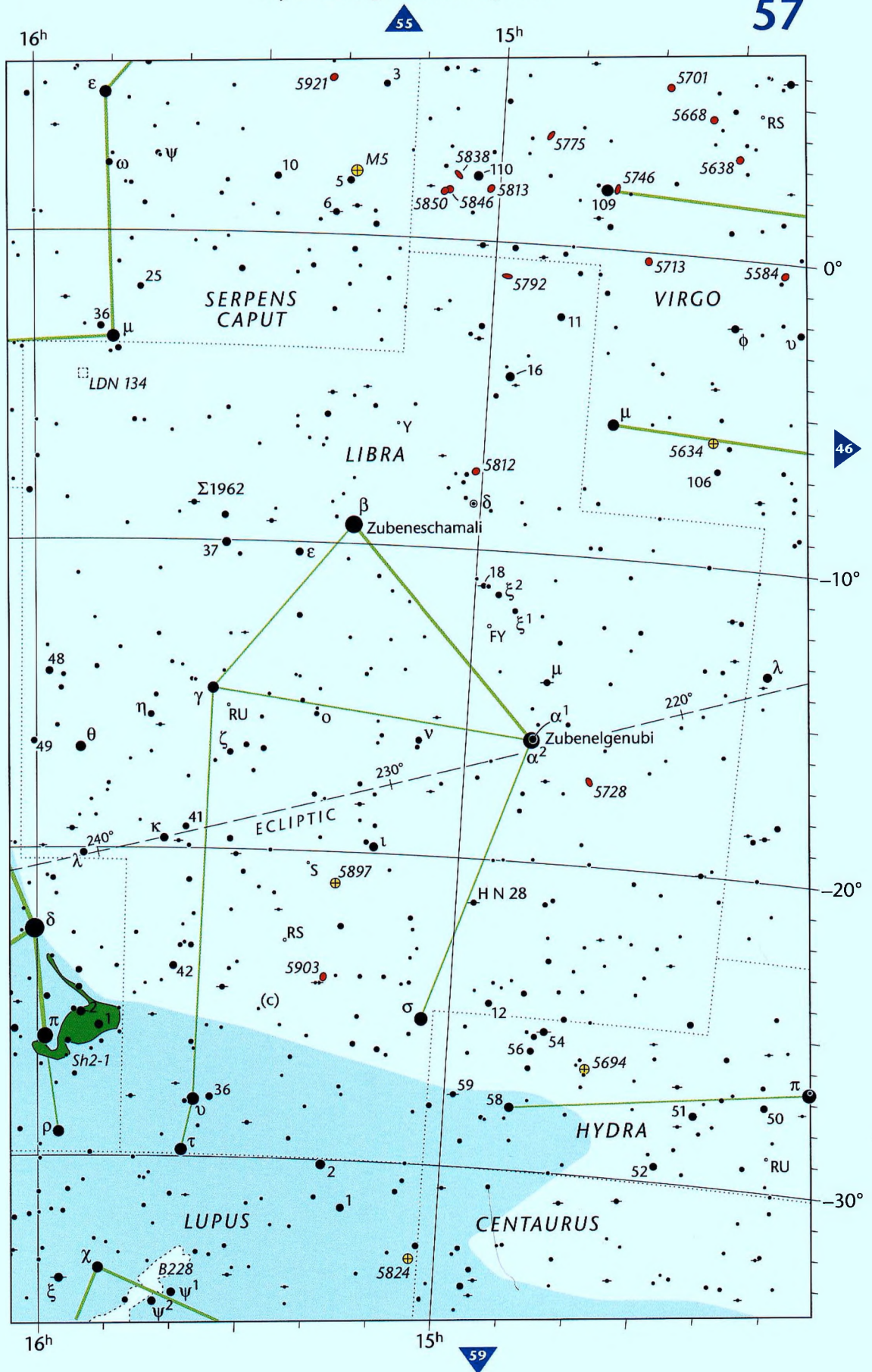


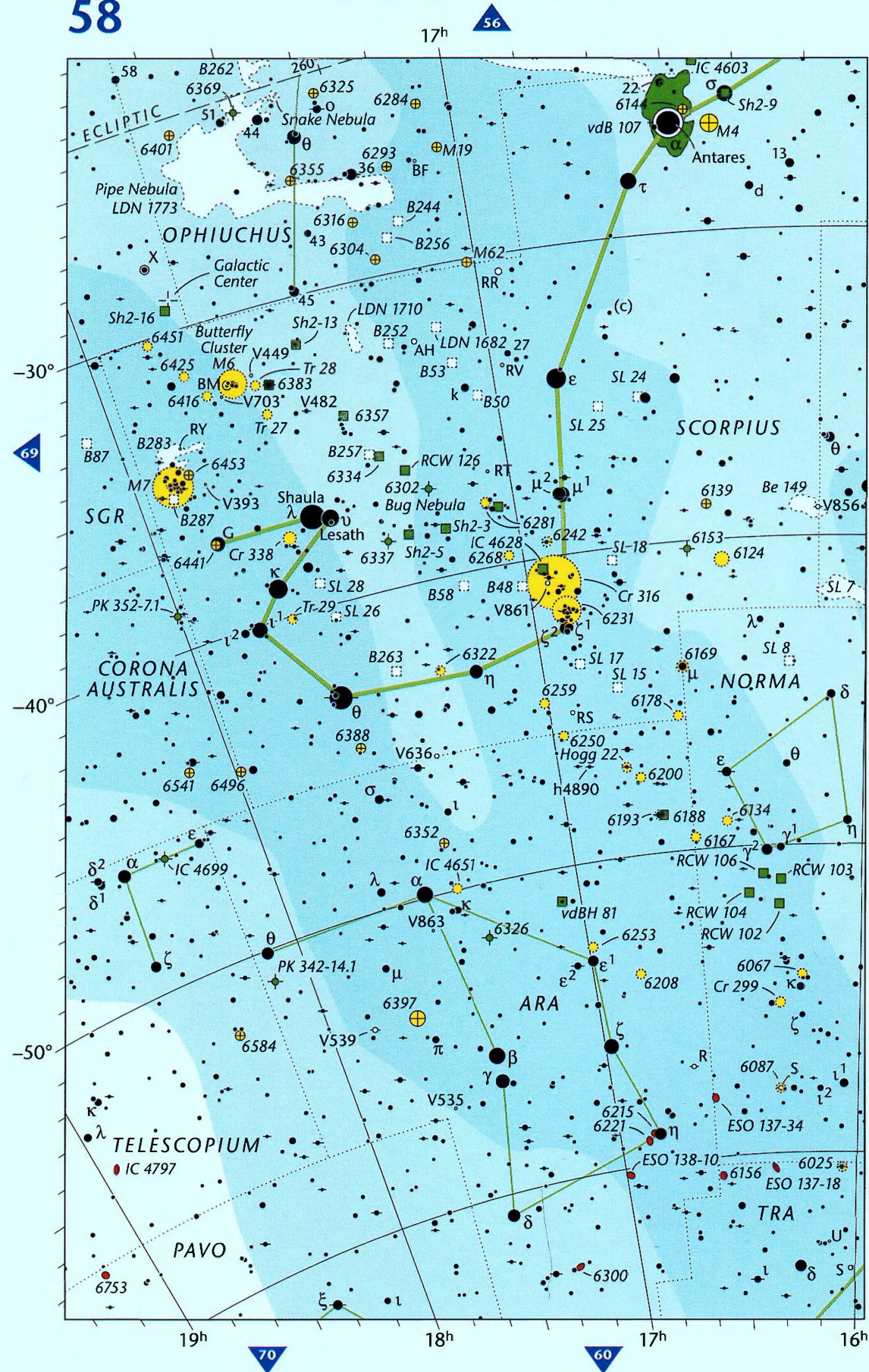


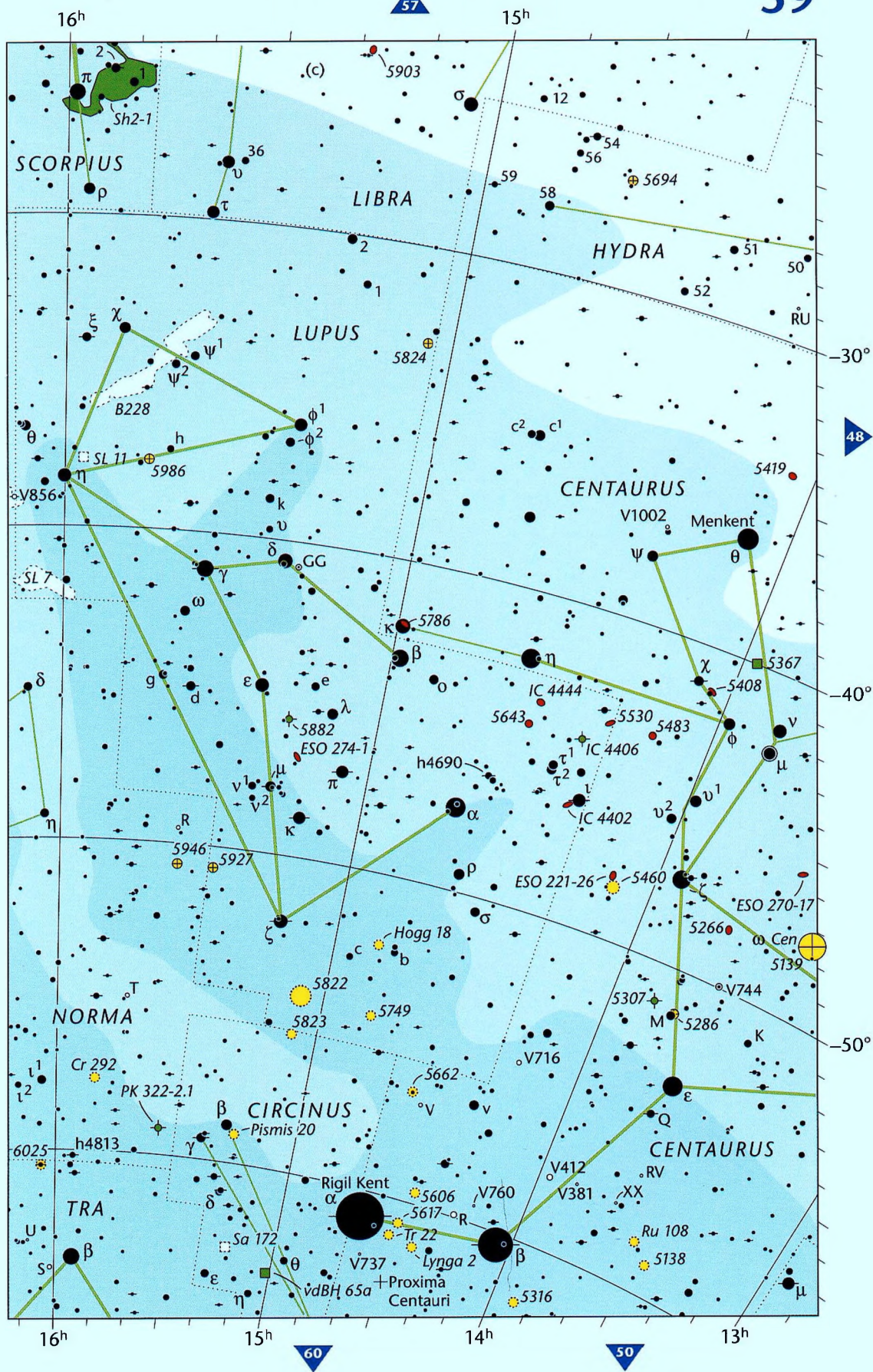








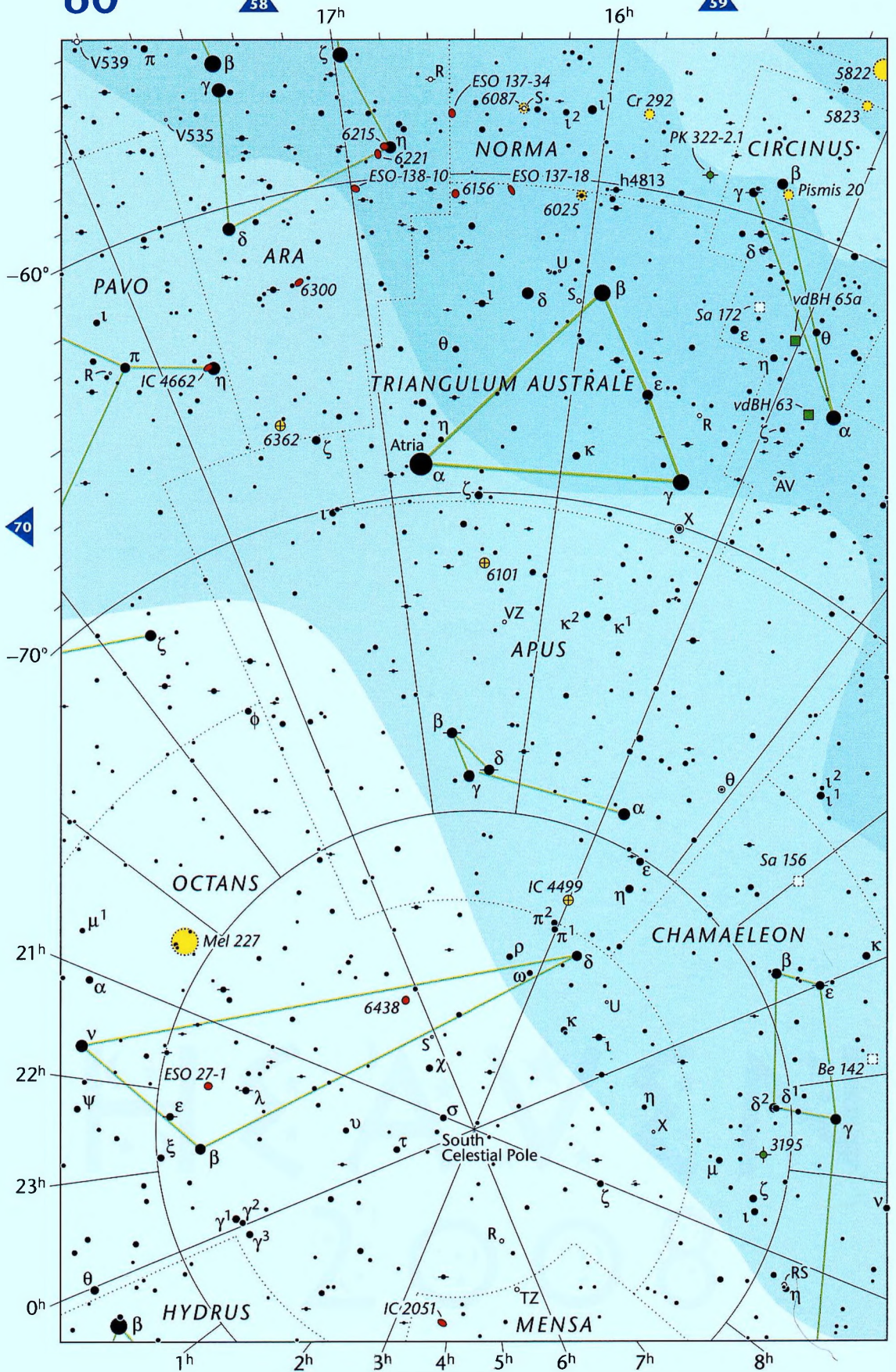




60

58

59



Charts 61-70

Right Ascension 18^h to 21^h

This section is highest in the night sky
around these times:

Evening: August & September

Midnight: July

Morning: May & June

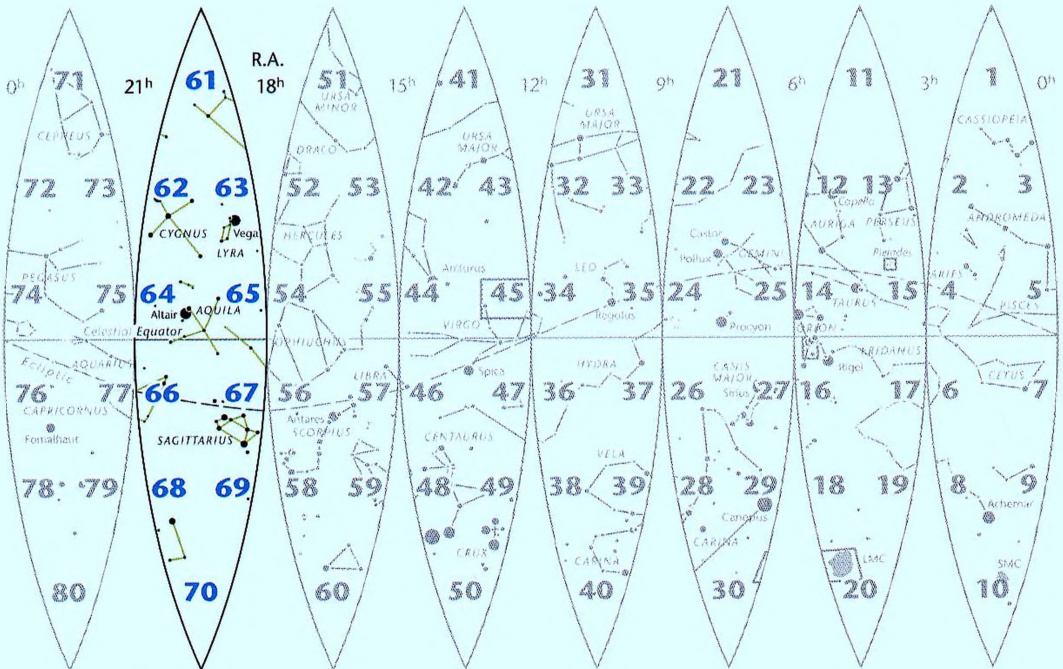


Chart Legend

● Double star

⊙ Variable stars

× Special object

+ Reference point

Open star clusters

50' (to scale) <20'

Globular clusters

50' (to scale) <20'

Galaxies

100' x 20' (to scale)

40' x 30' (to scale)

<20'

Bright nebulae

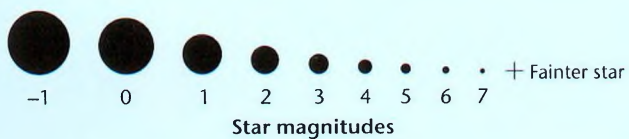
(to scale) <20'

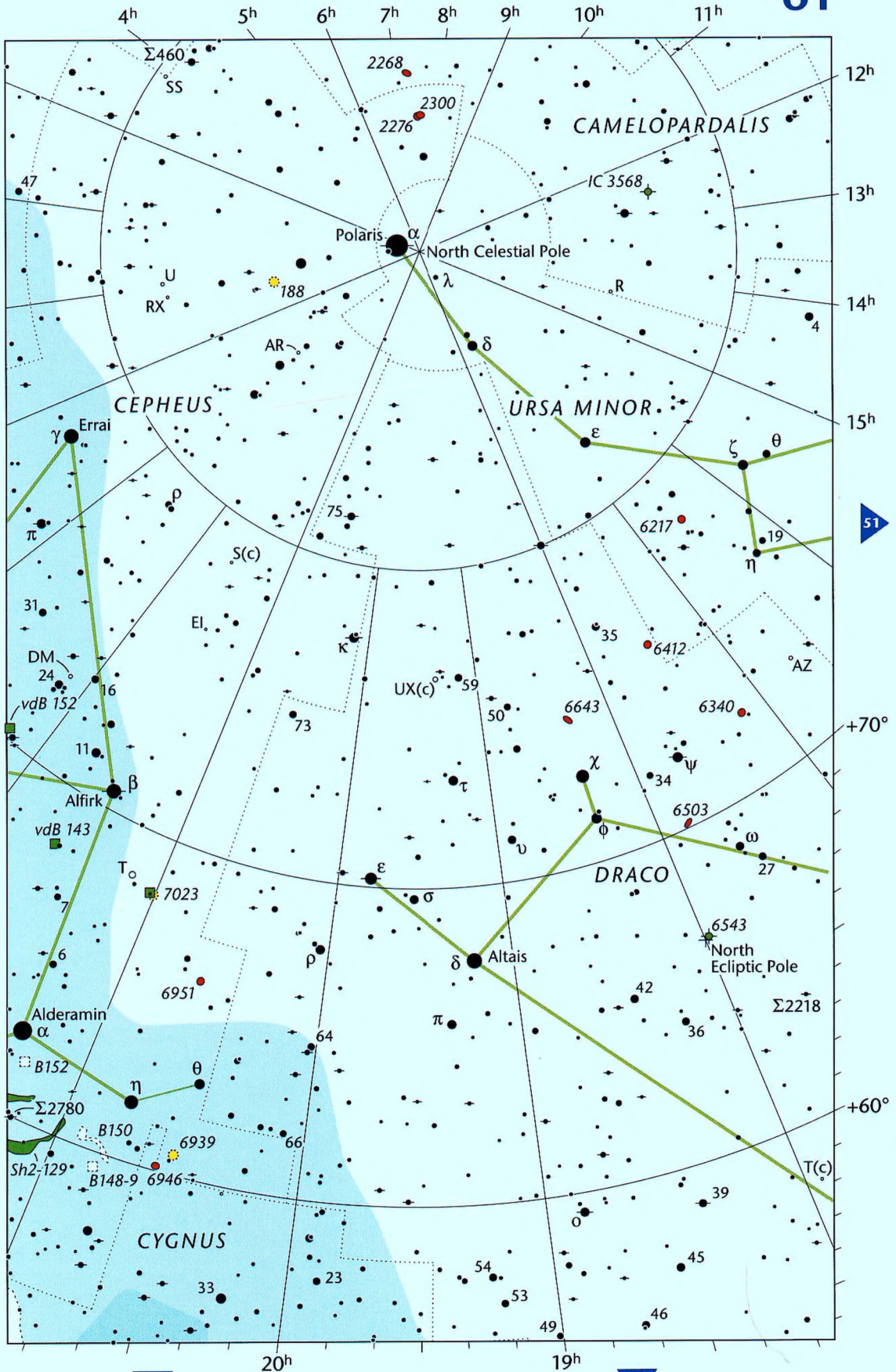
Dark nebulae

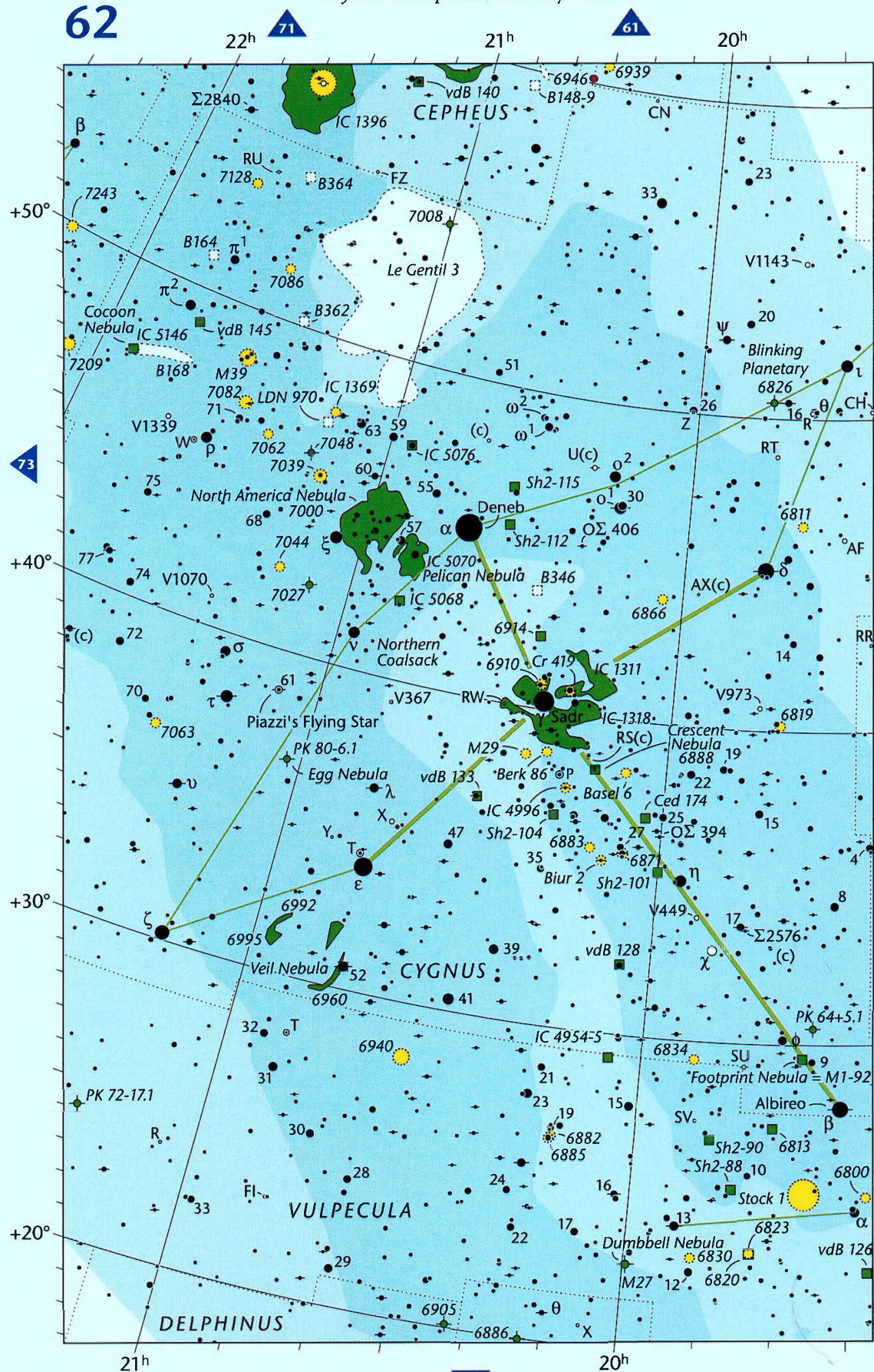
(to scale) <20'

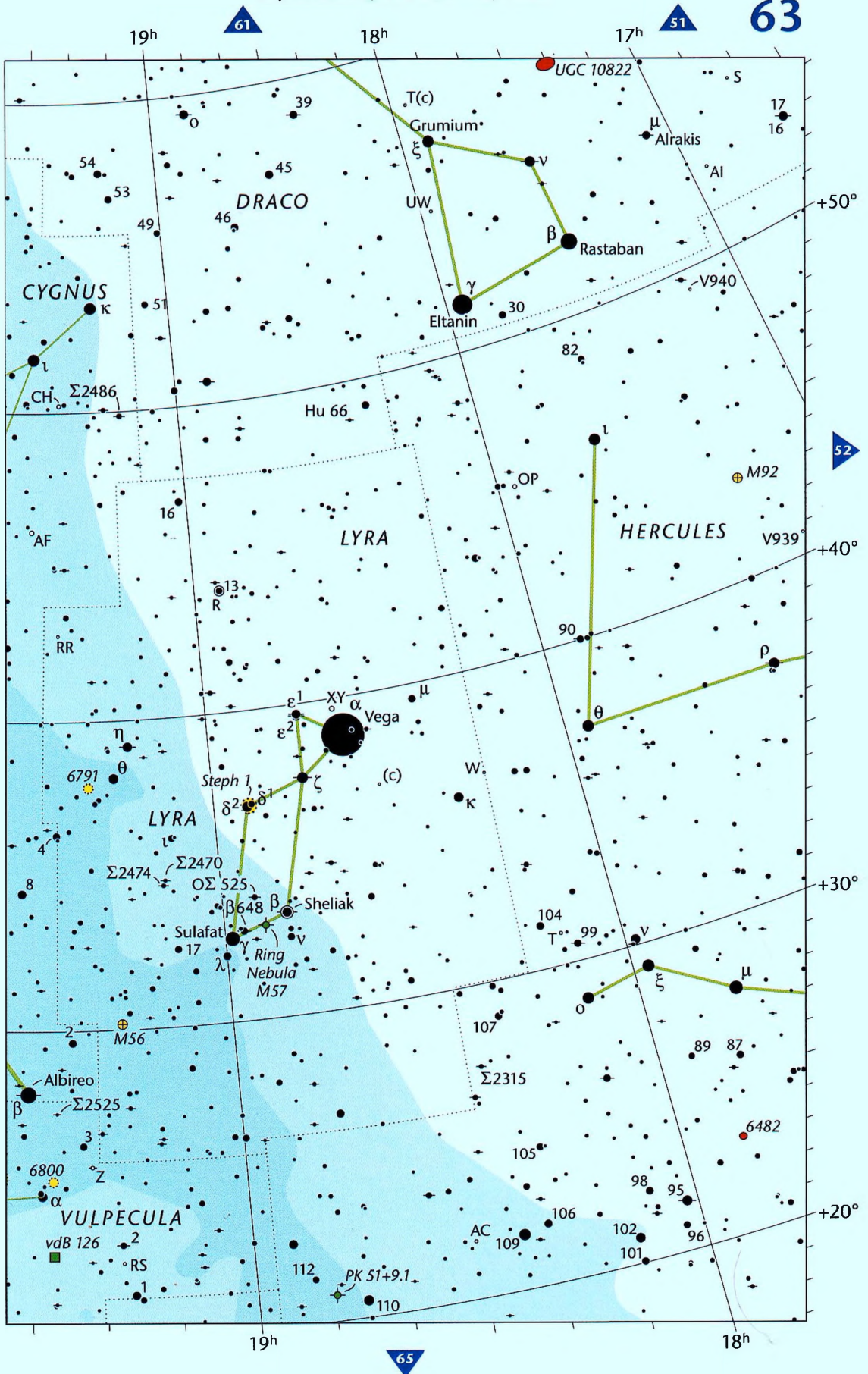
Planetary nebulae

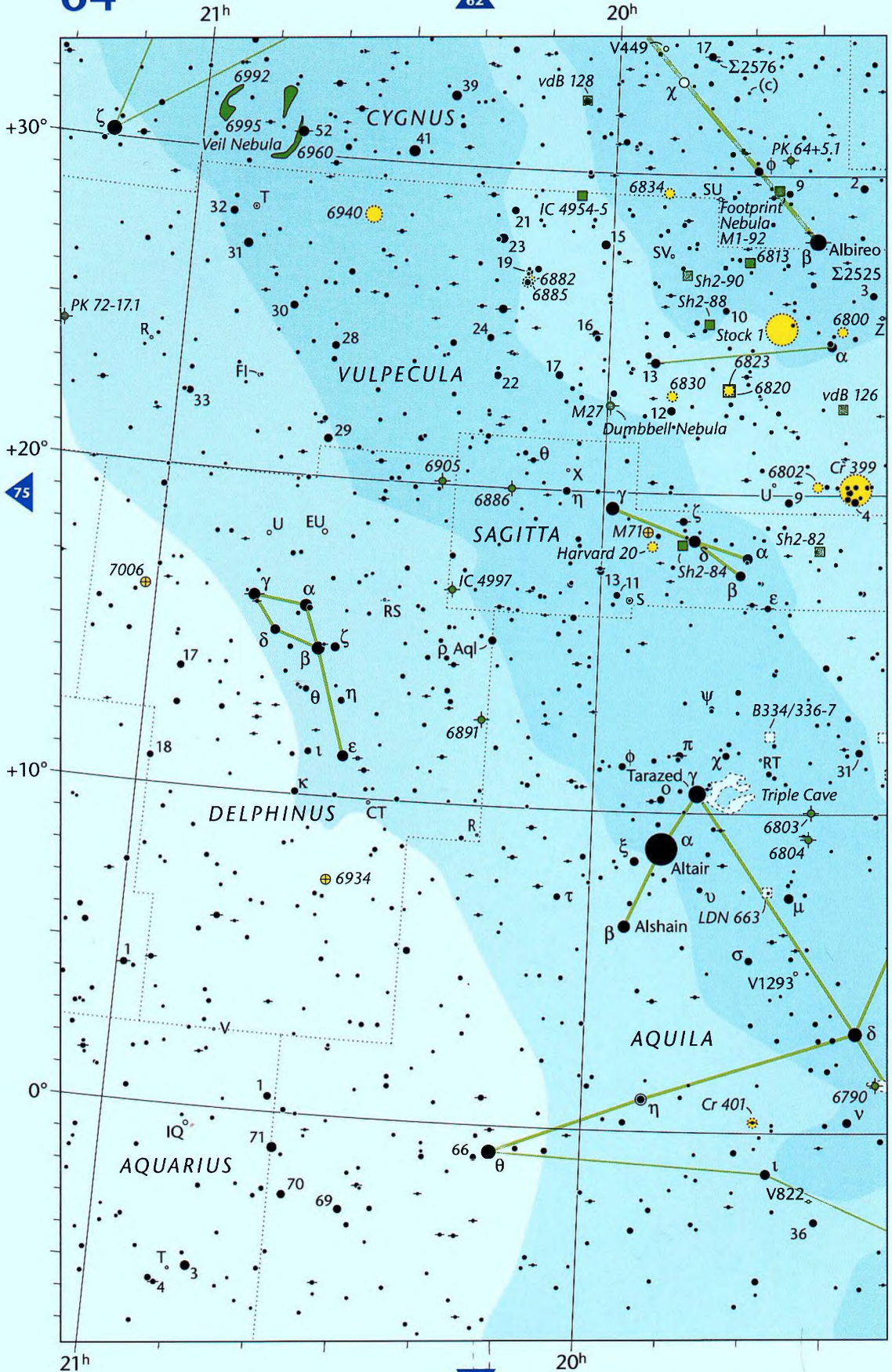
50' (to scale) <20'



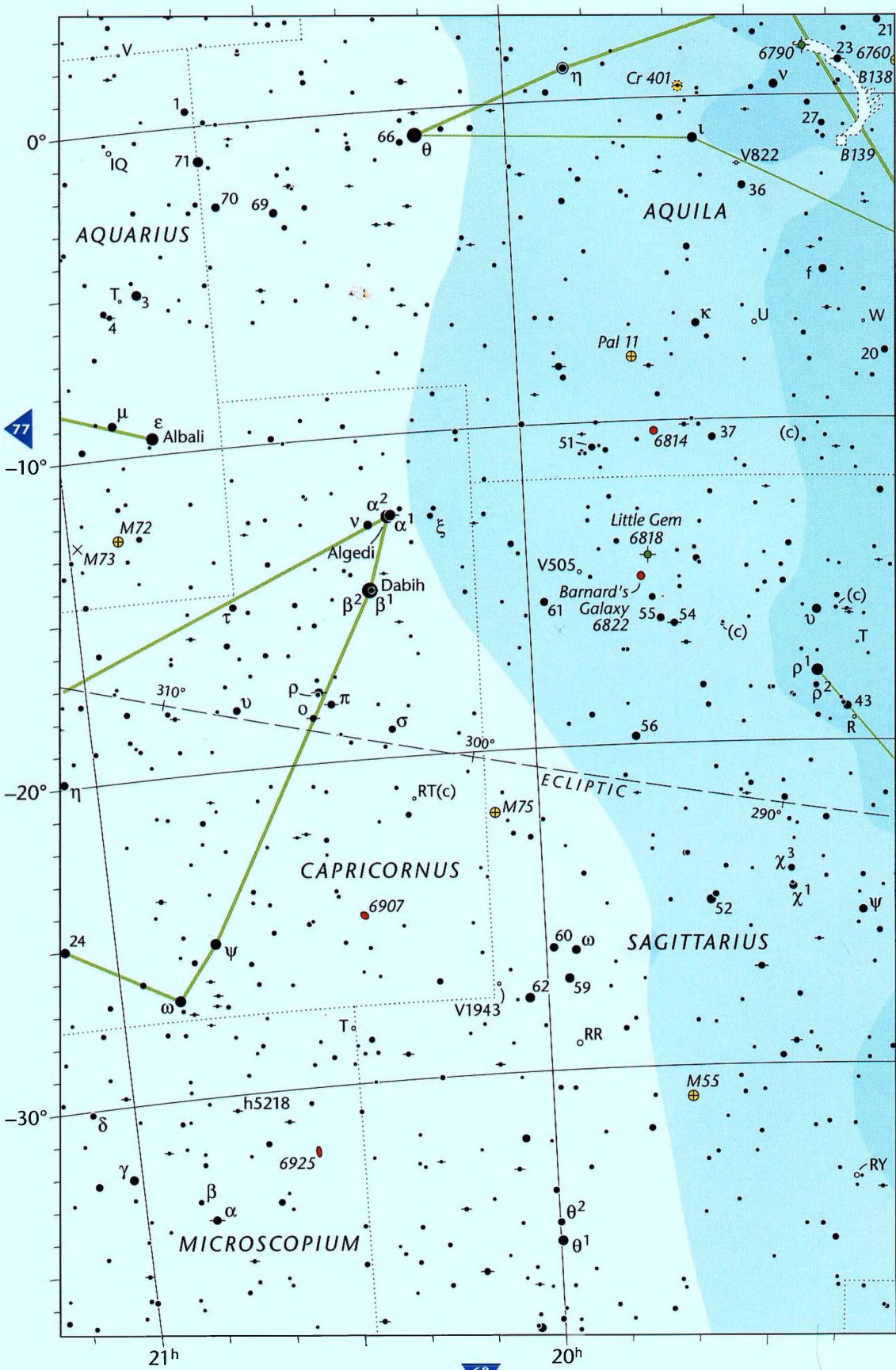


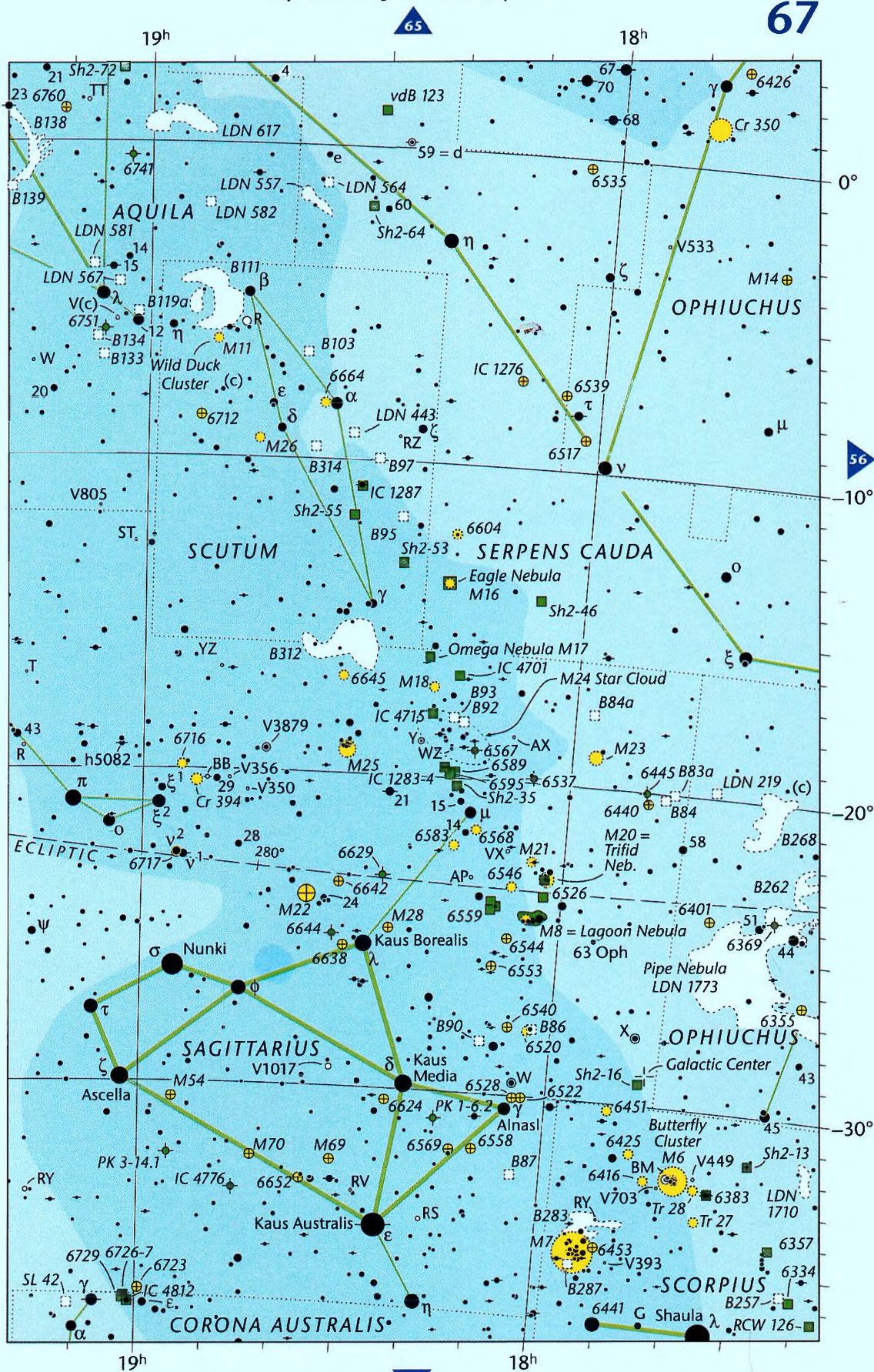


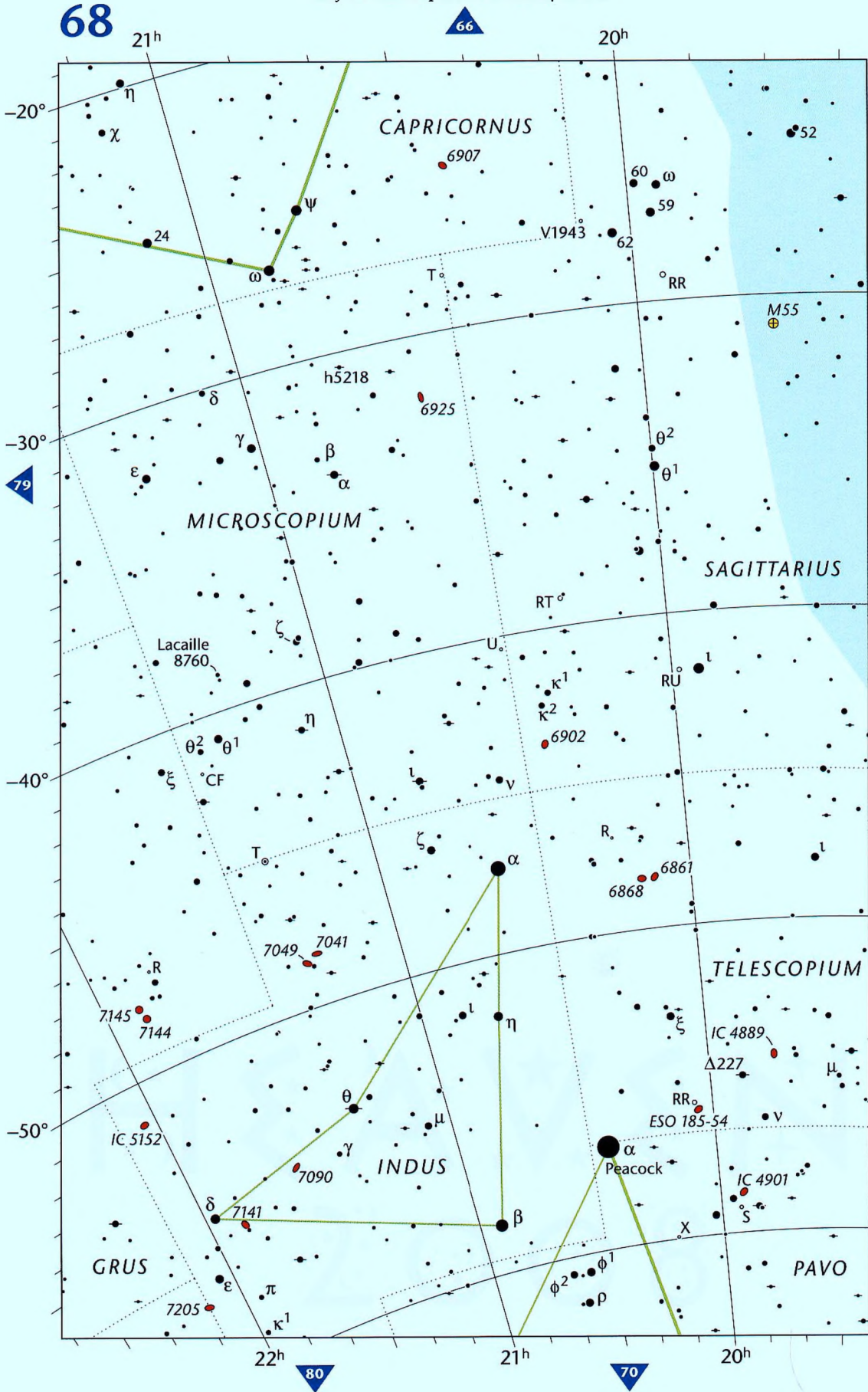


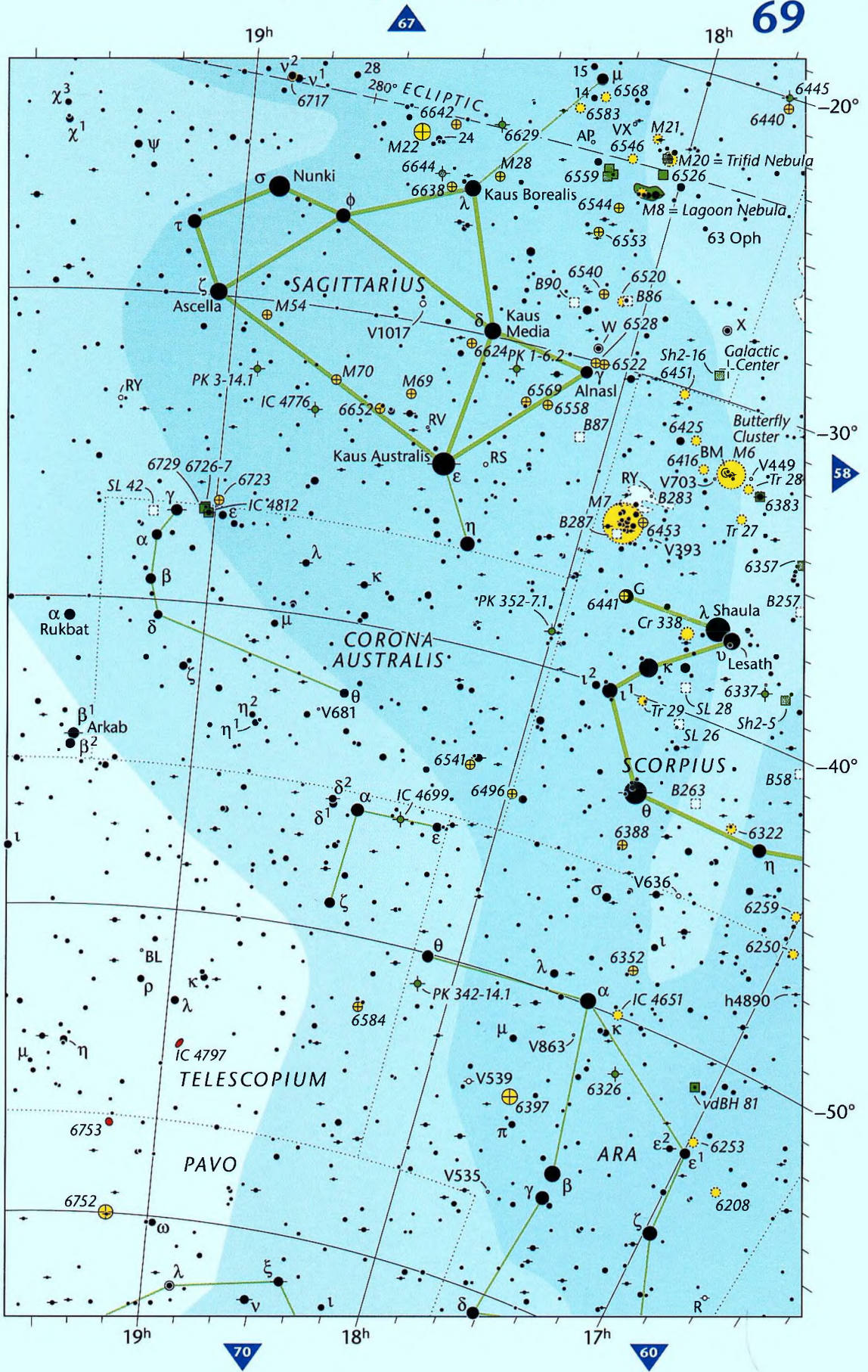


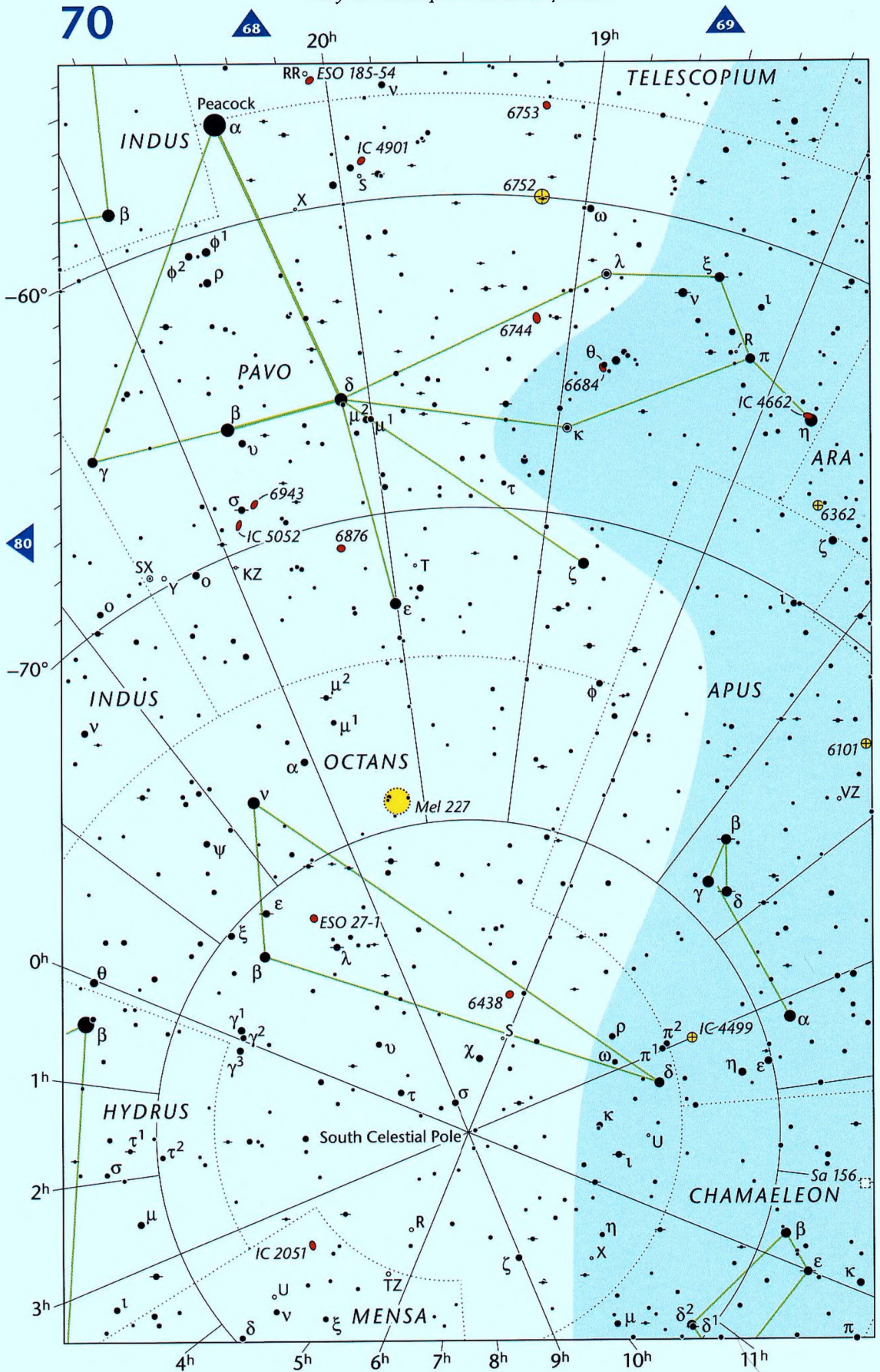












Charts 71-80

Right Ascension 21^h to 0^h

This section is highest in the night sky around these times:

Evening: October

Midnight: August & September

Morning: July

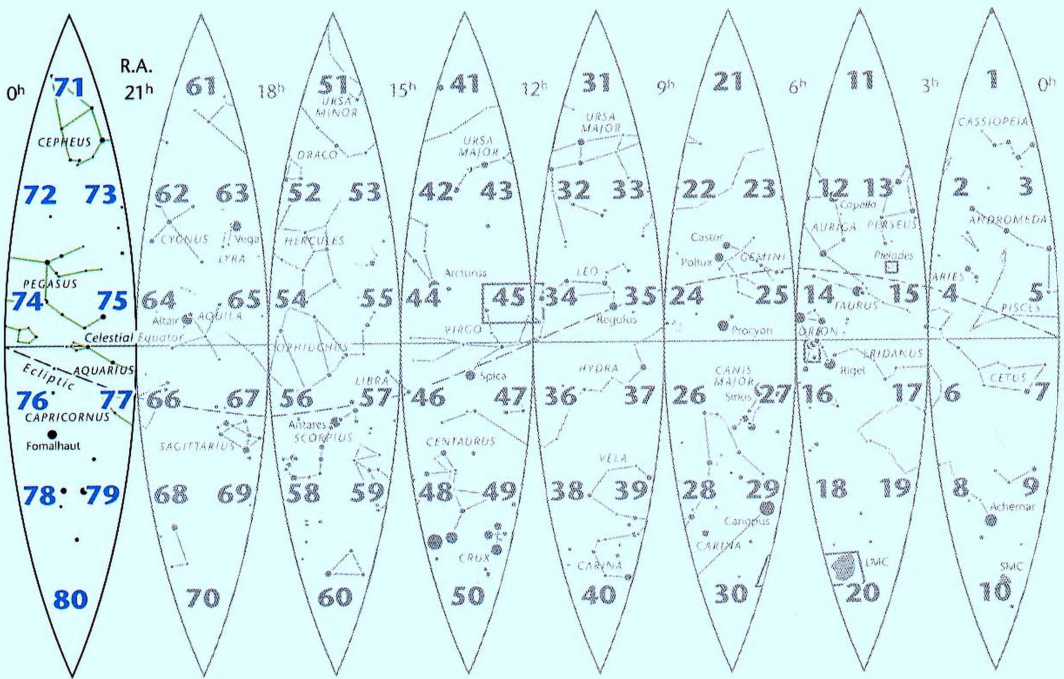


Chart Legend

● Double star

⊙ Variable stars

× Special object

+ Reference point

Open star clusters

50' (to scale) <20'

Globular clusters

50' (to scale) <20'

Galaxies

100' x 20' (to scale)

40' x 30' (to scale)

<20'

Bright nebulae

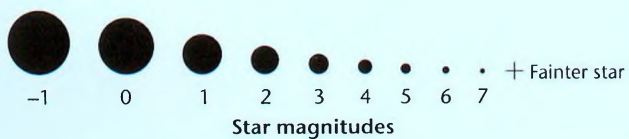
(to scale) <20'

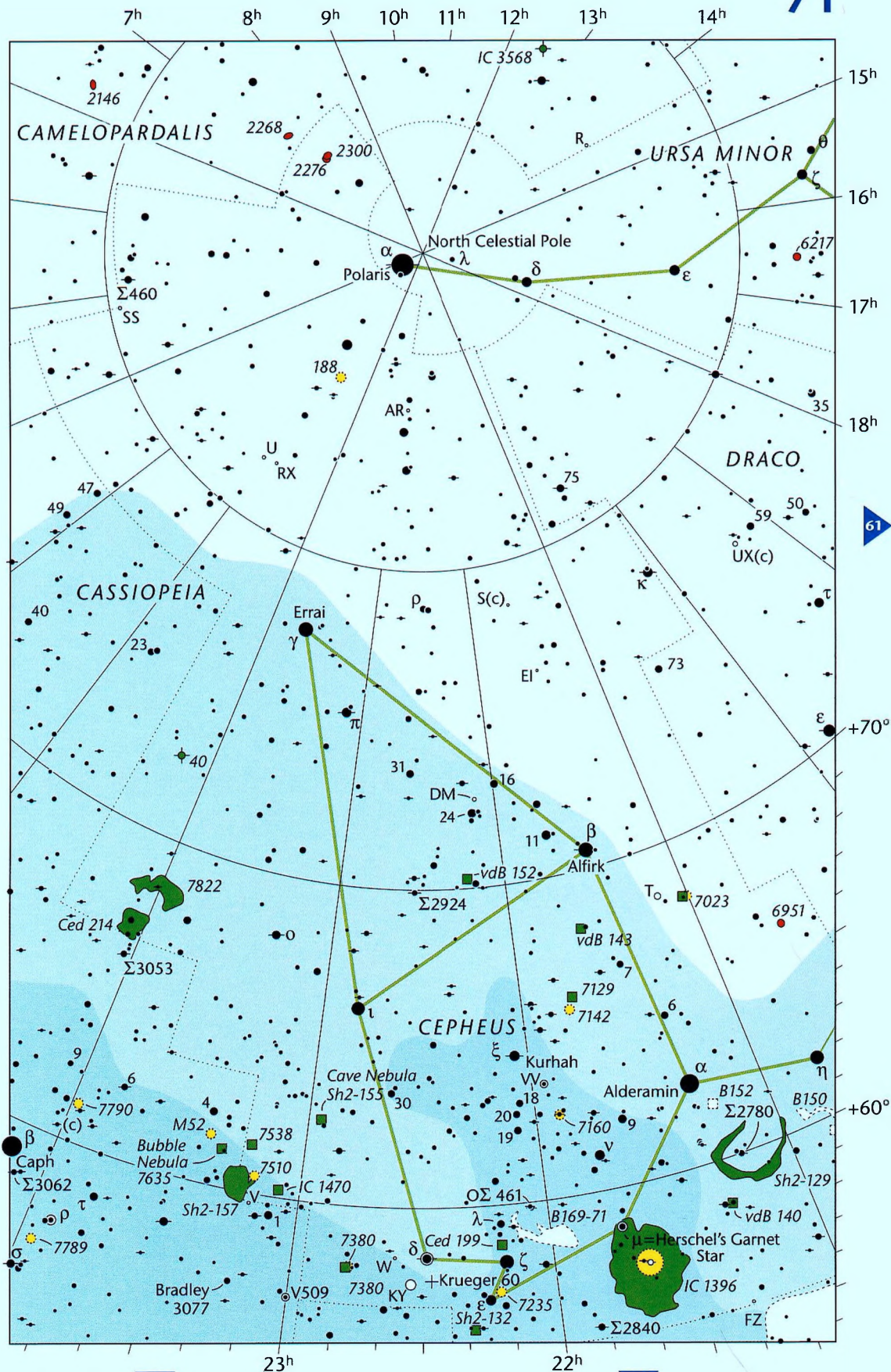
Dark nebulae

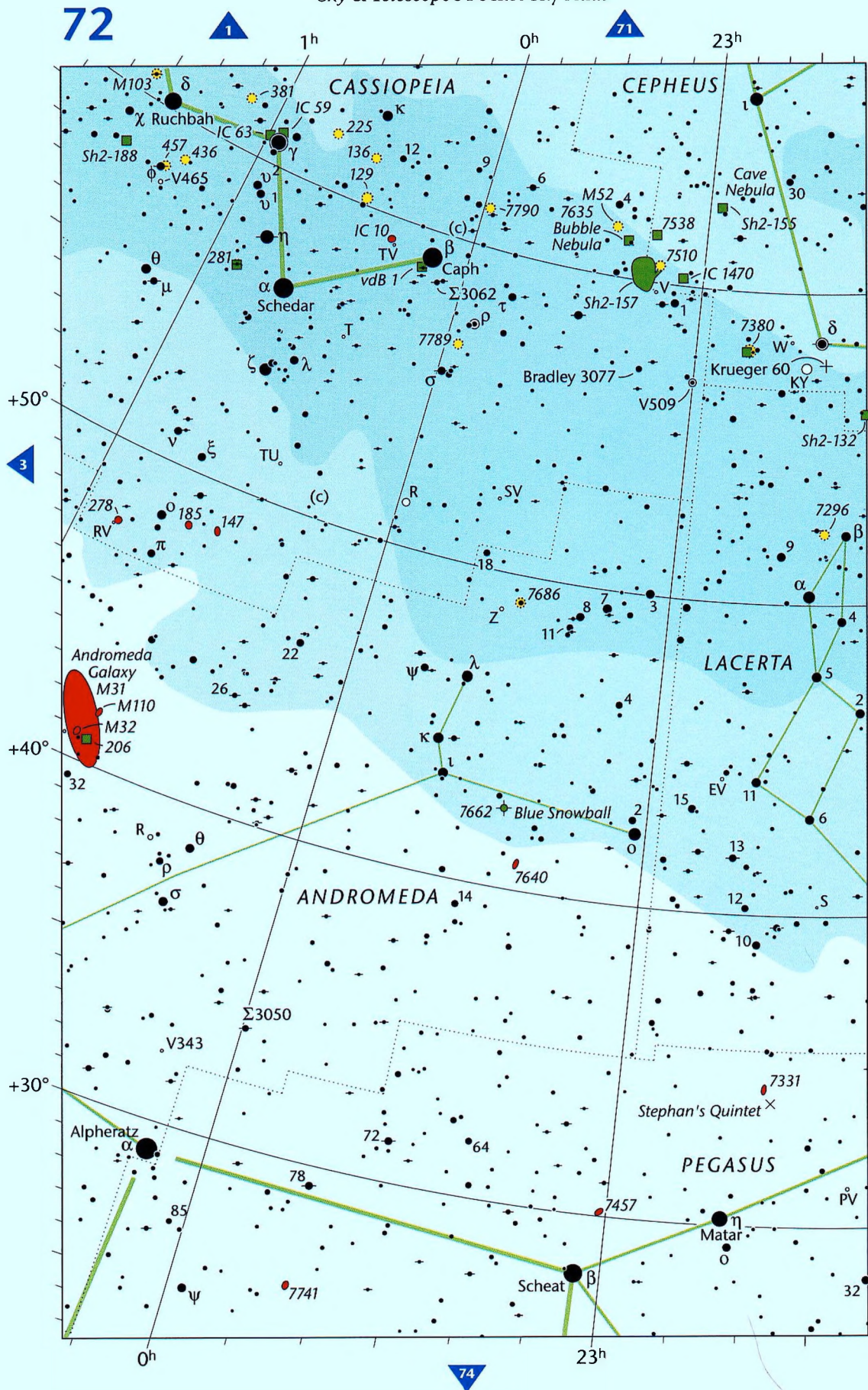
(to scale) <20'

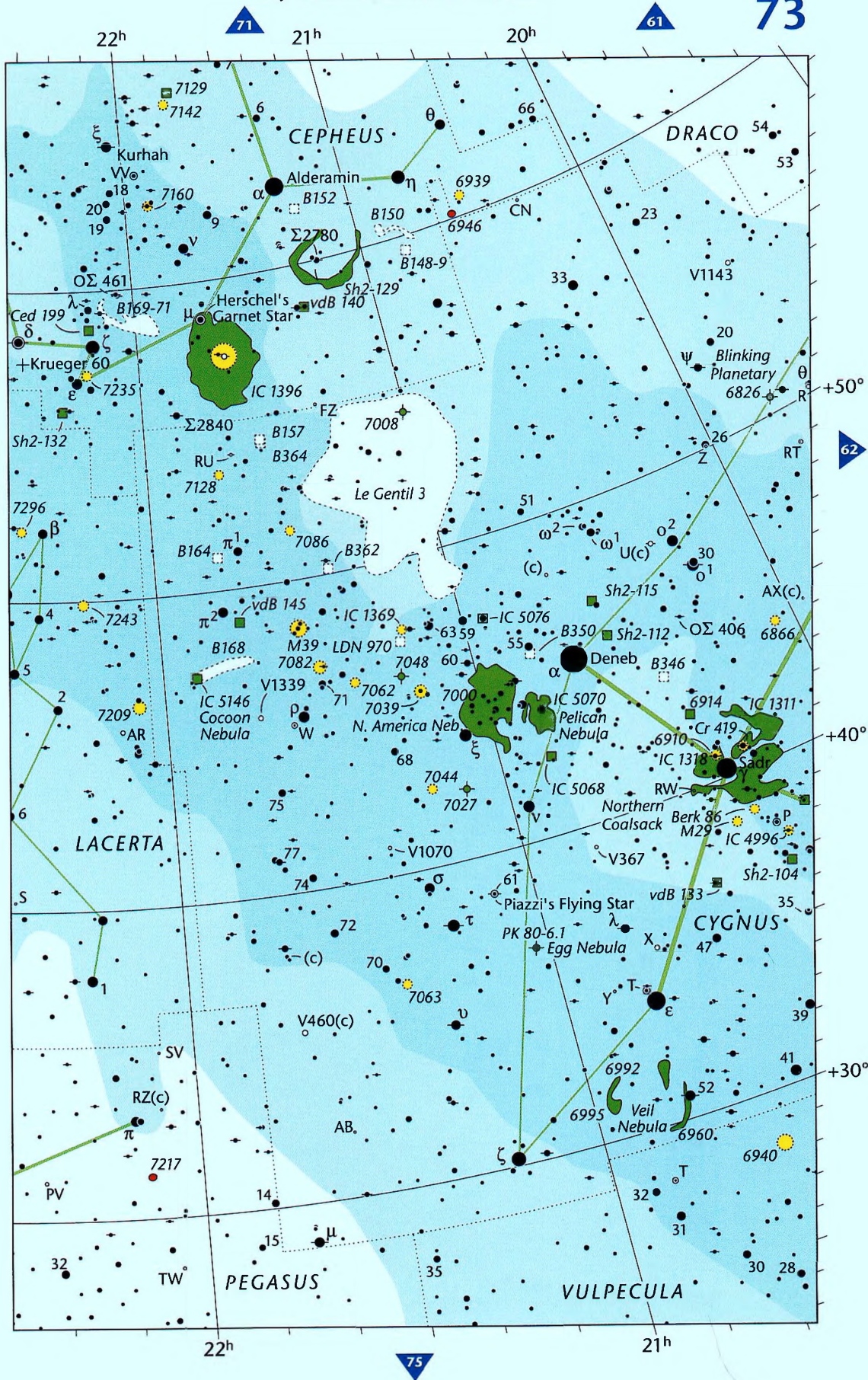
Planetary nebulae

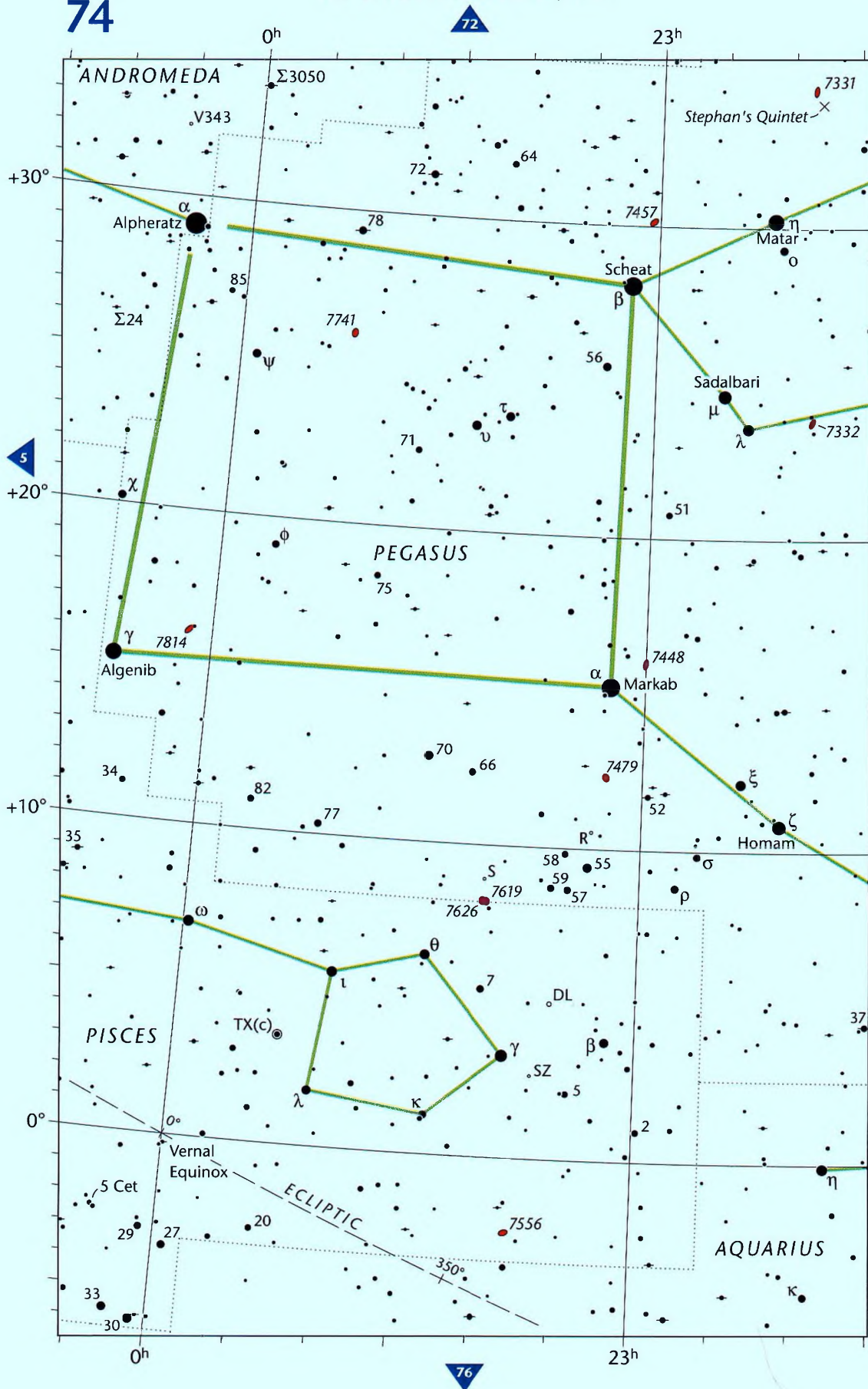
50' (to scale) <20'

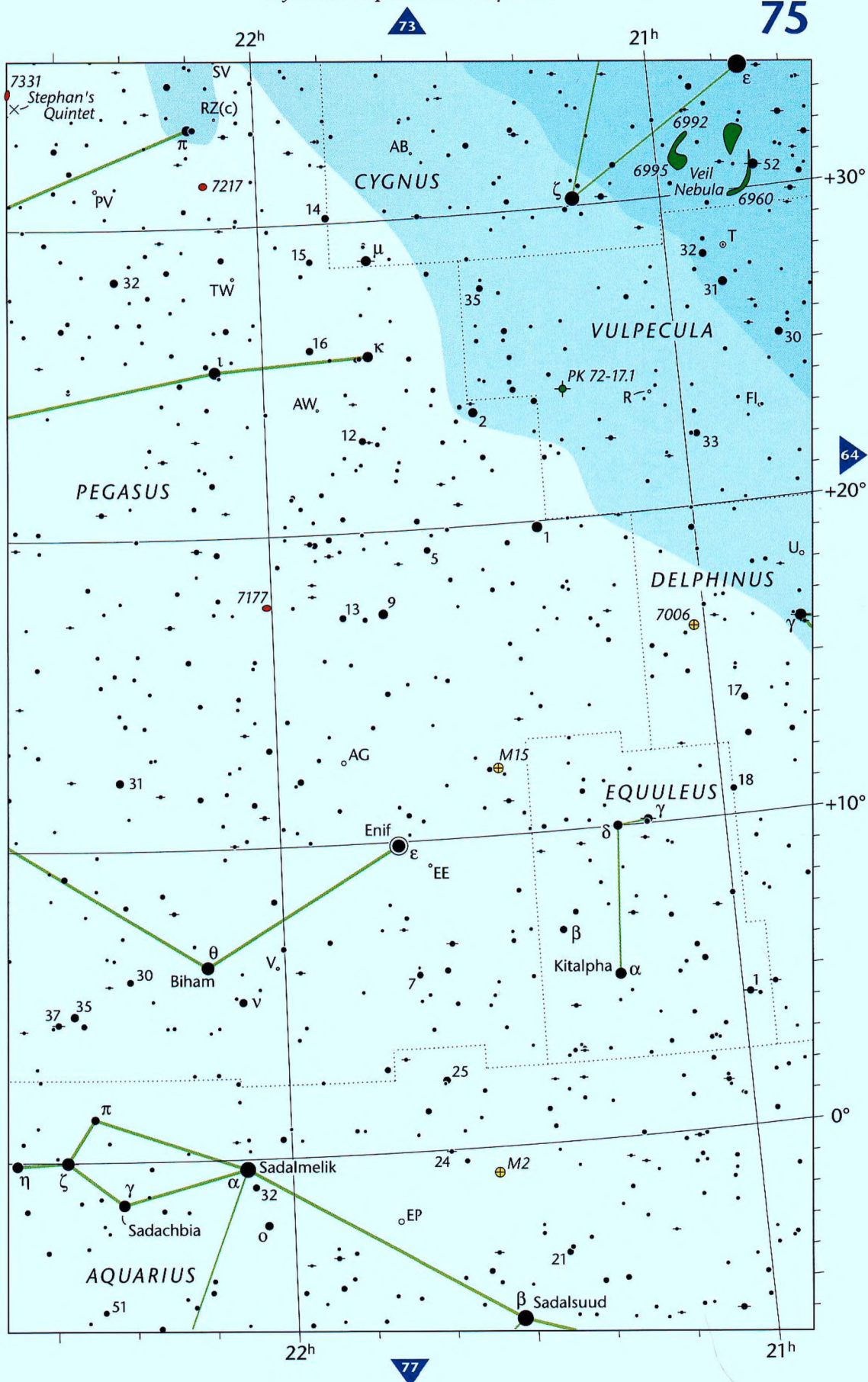


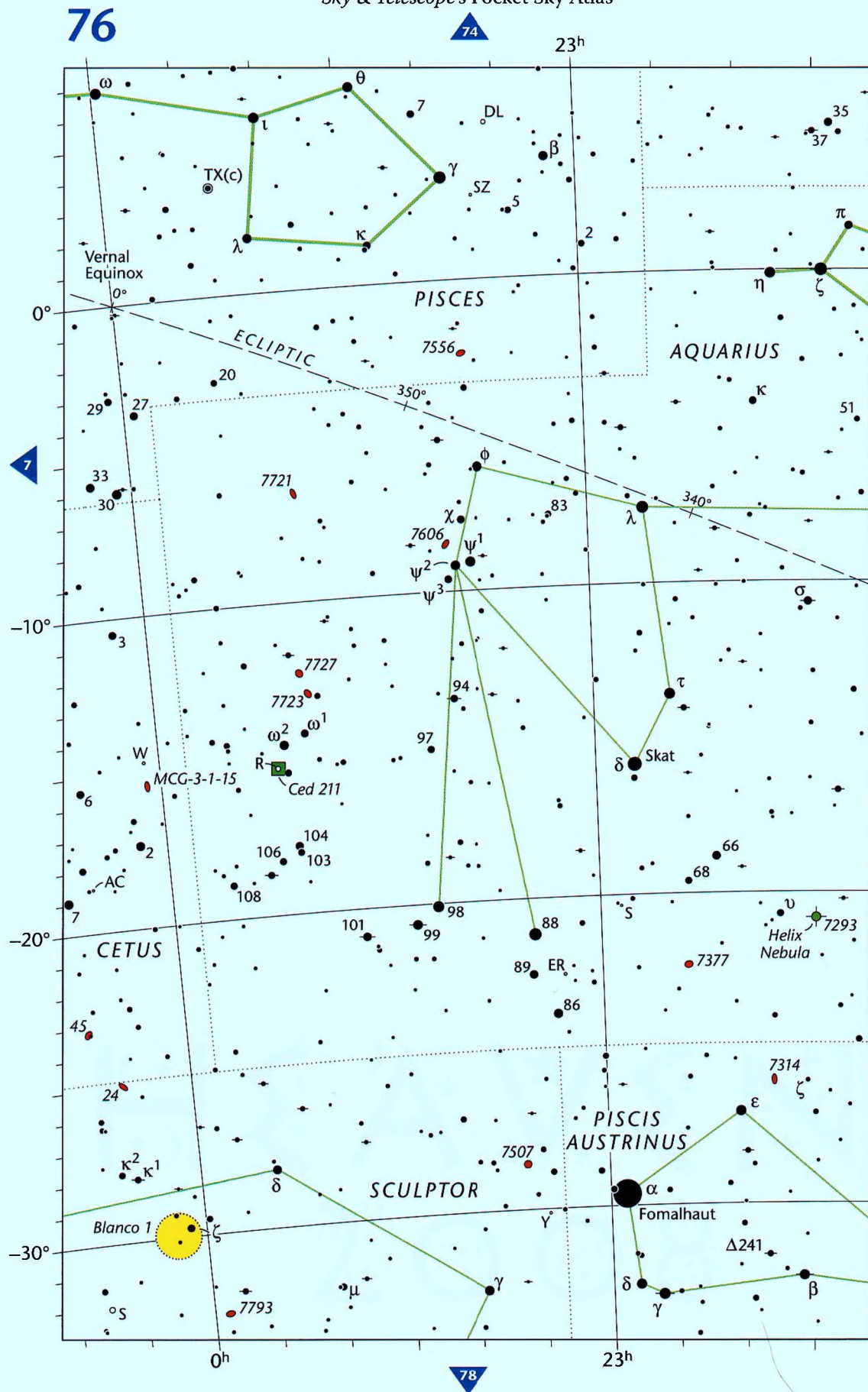


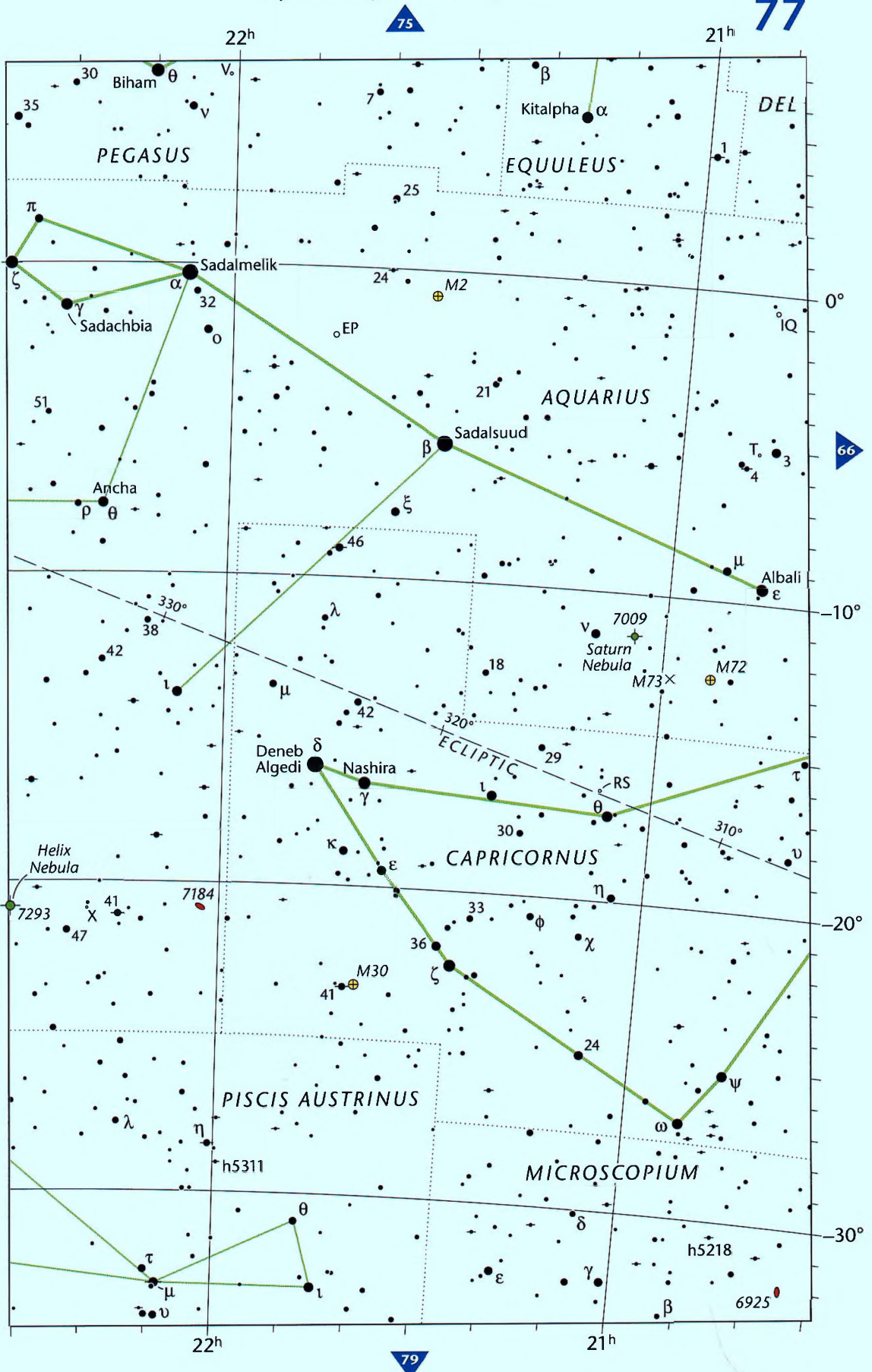


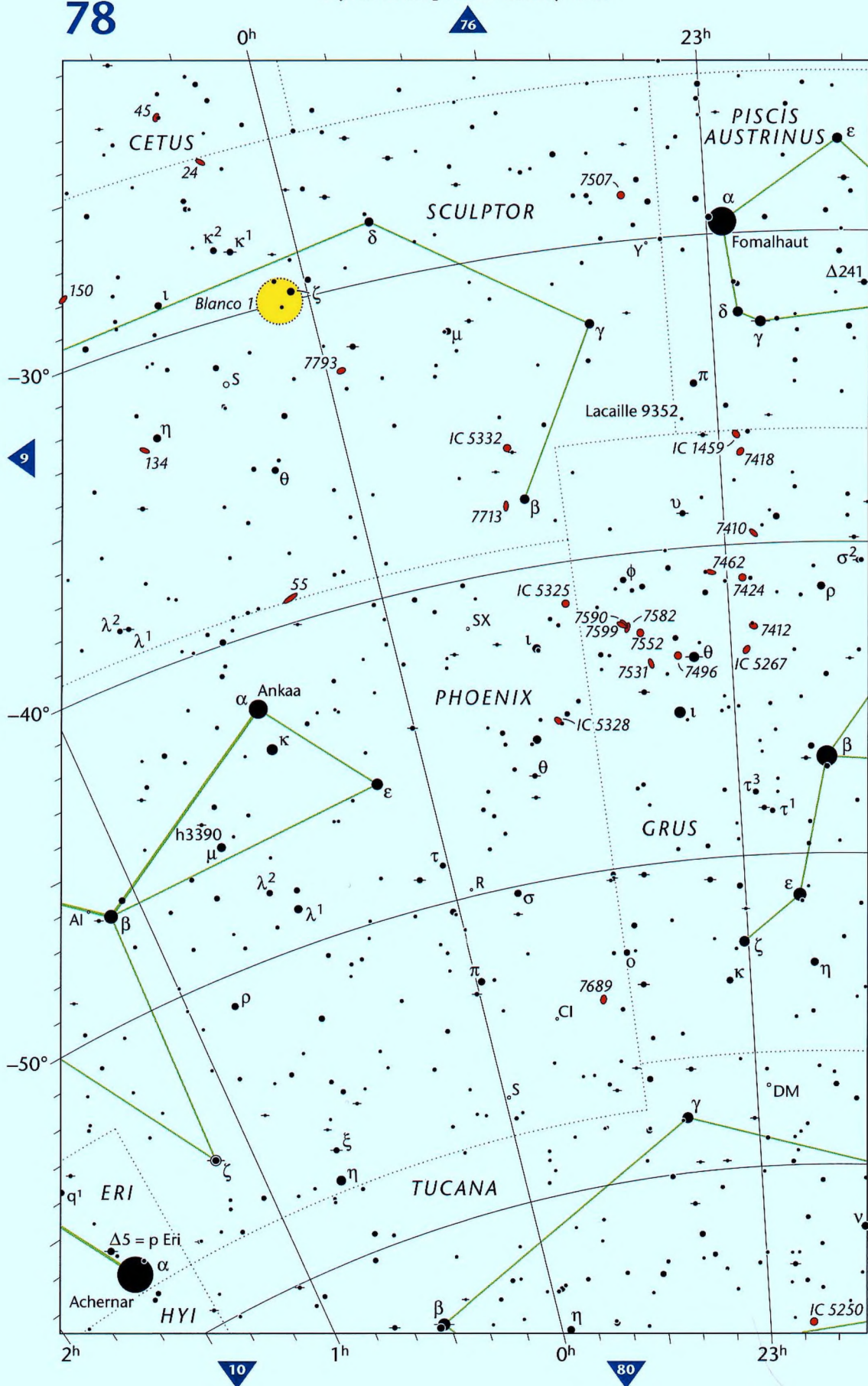


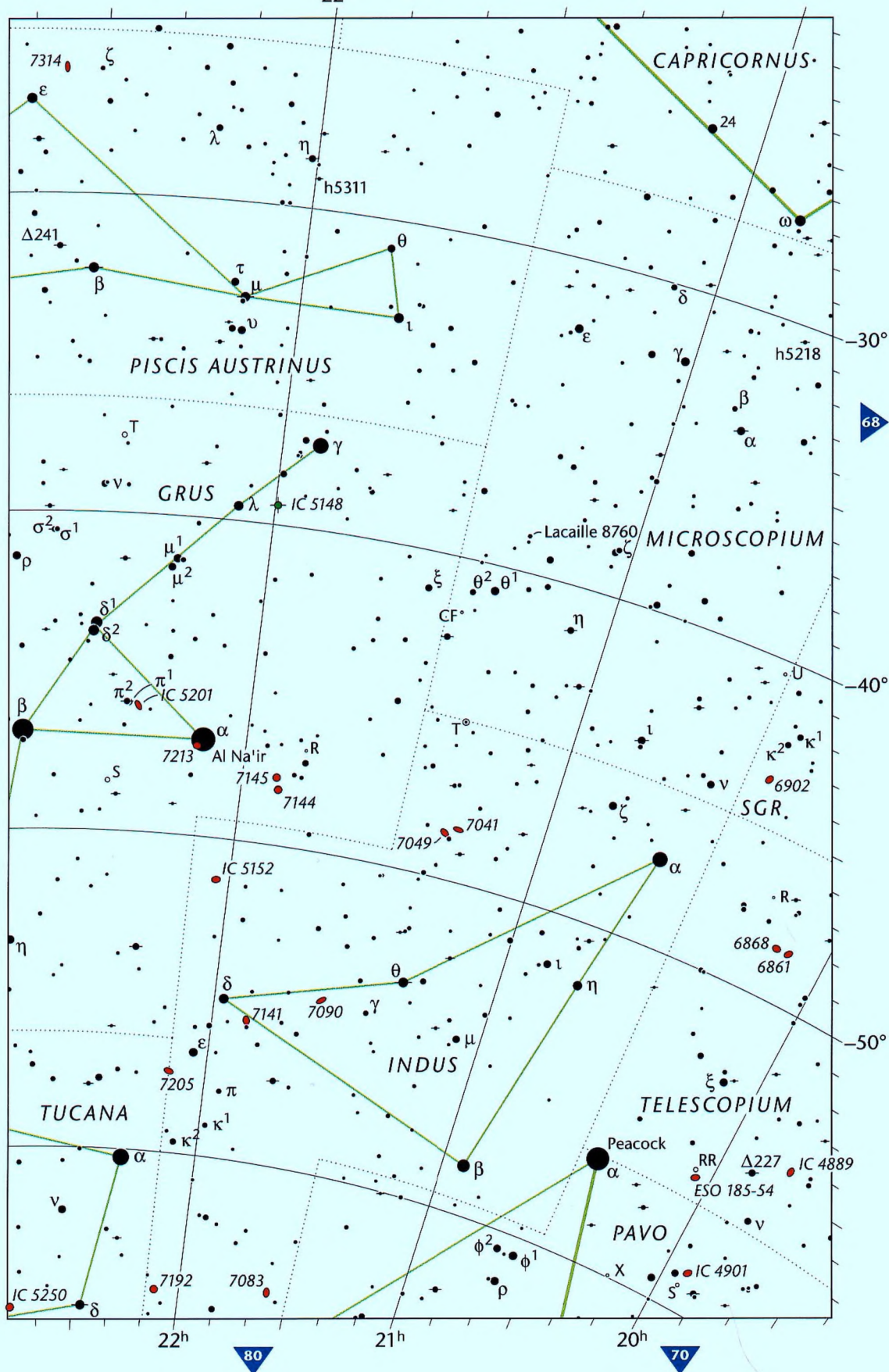


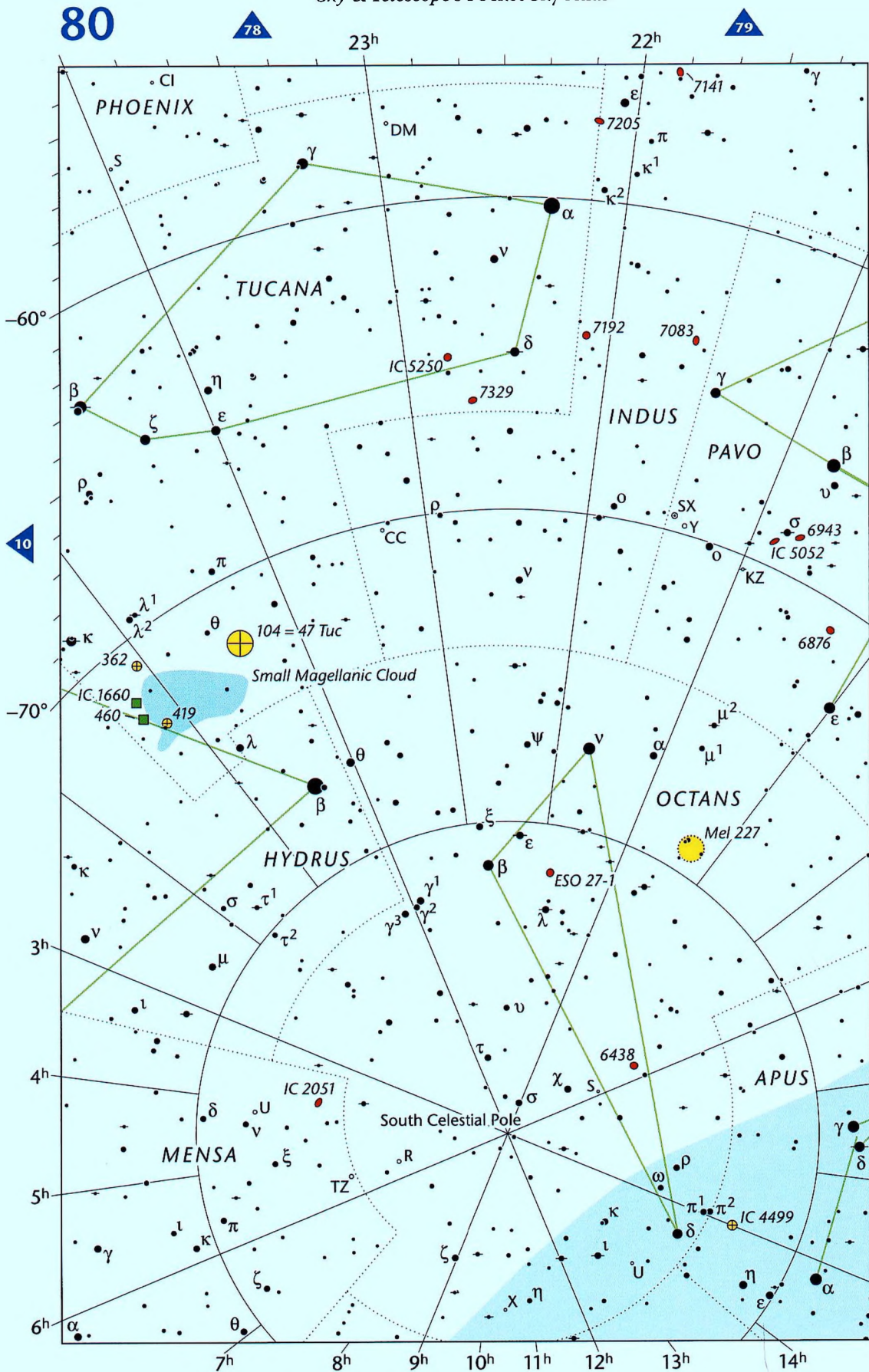








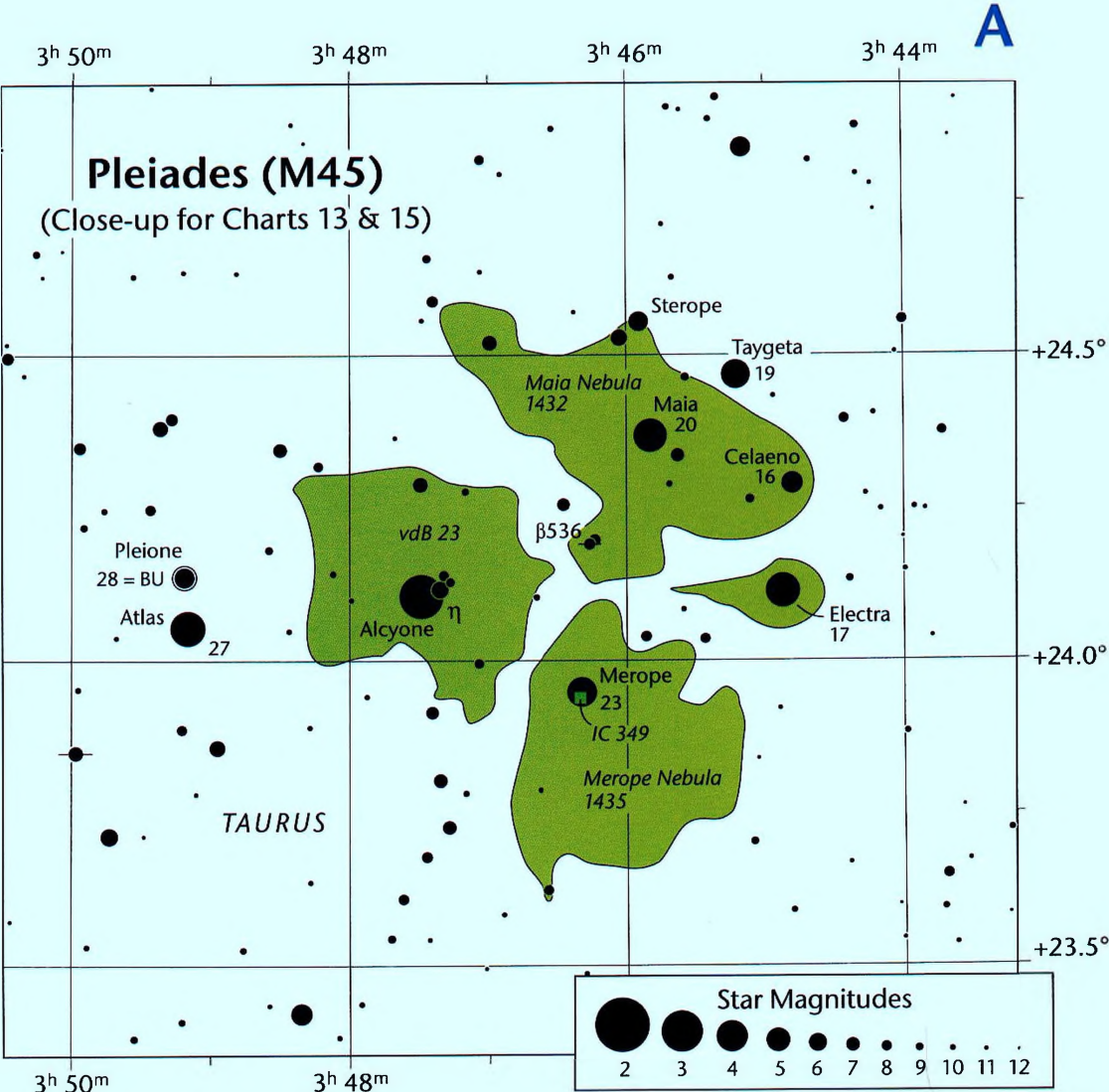




Close-up Charts

The following four charts show some of the most-observed regions of the sky. Compared to those in the main atlas, these charts have a larger scale and include fainter stars and

more detail in nebulous areas.
Chart A covers the Pleiades and some of the nebulosity around individual stars. This is the best-known open star cluster in the heavens, but here we omit the dotted
continued on Chart D



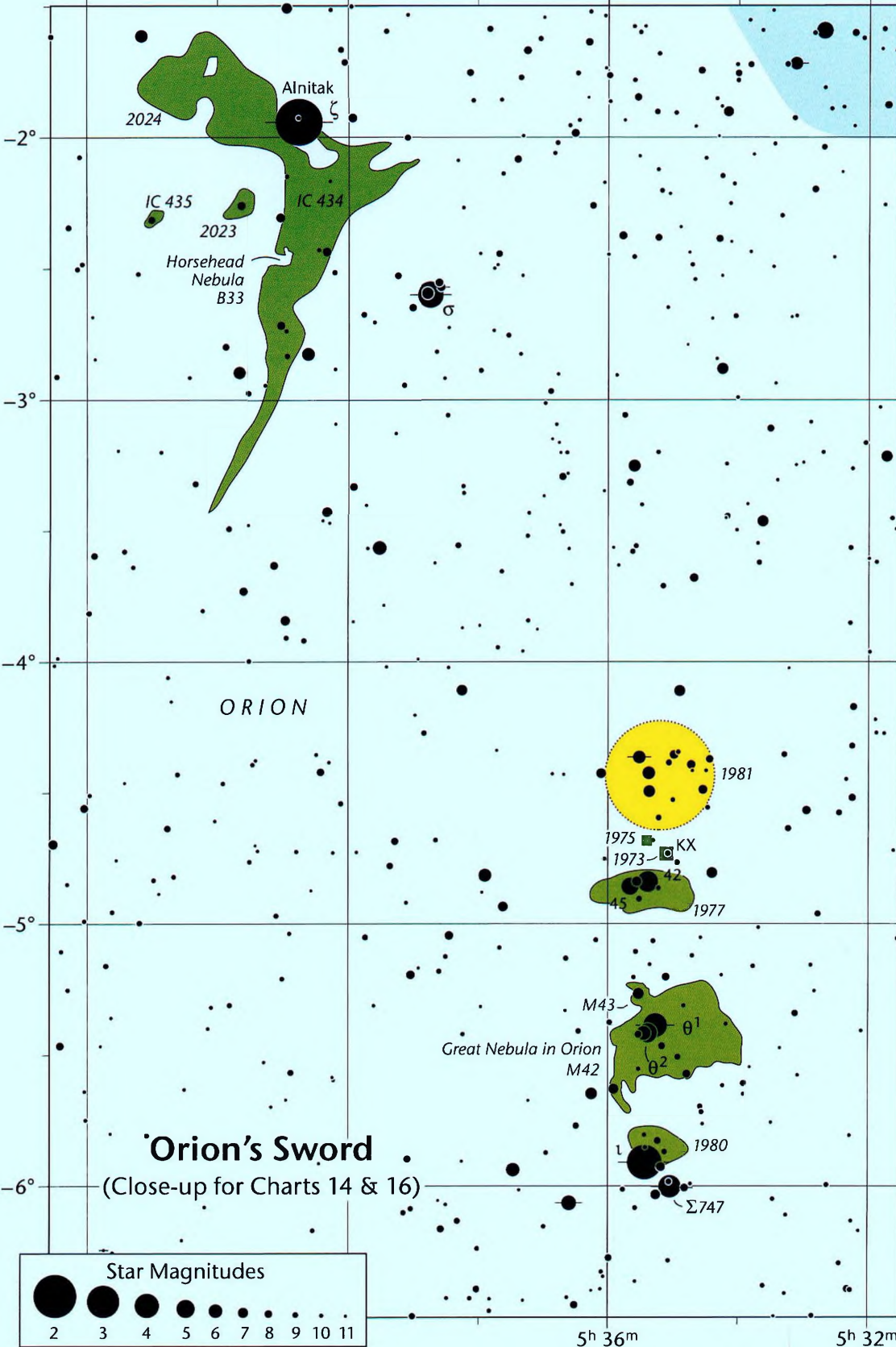
B

5h 44m

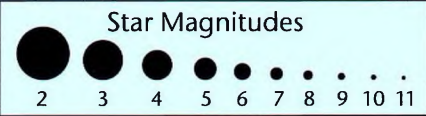
5h 40m

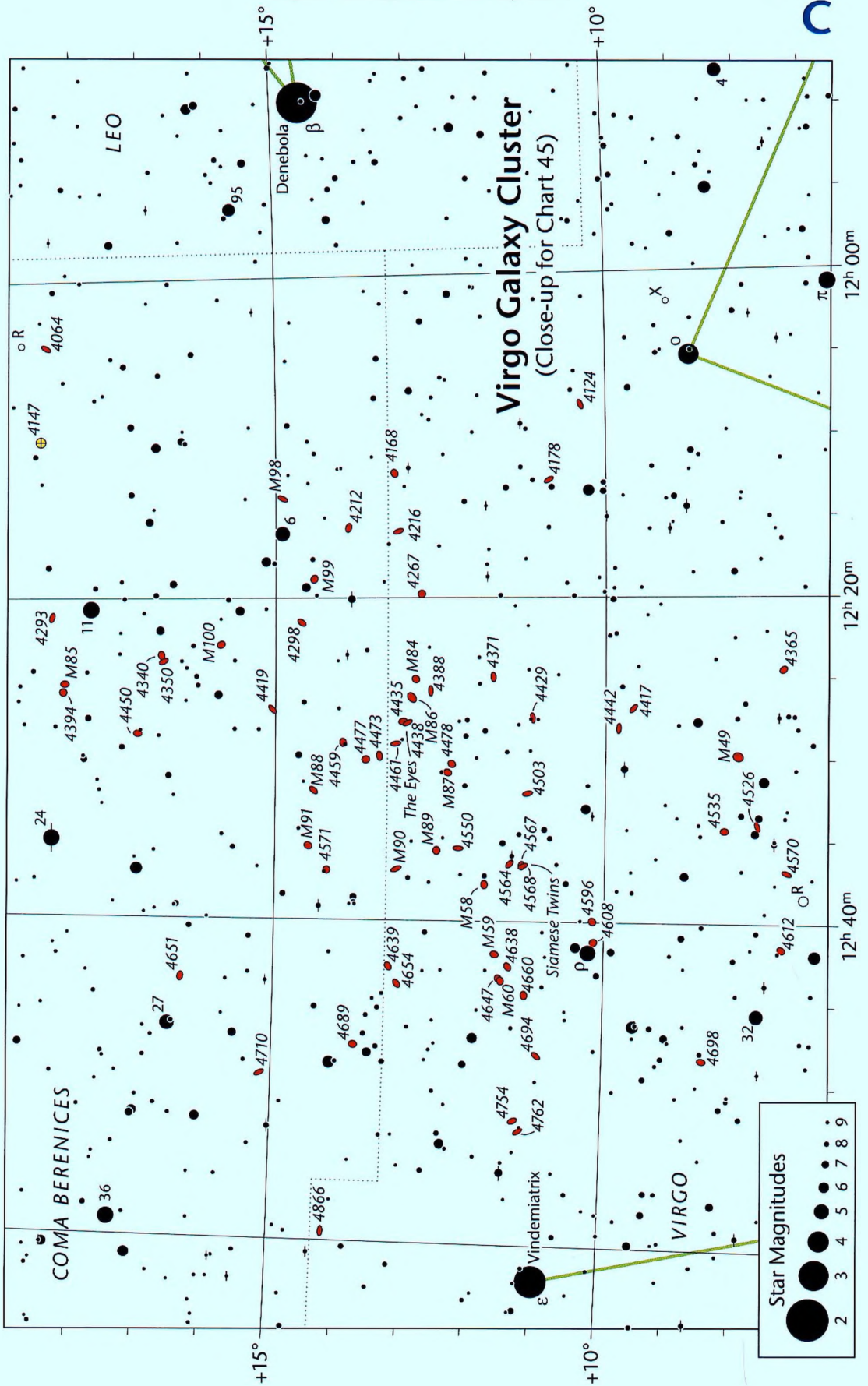
5h 36m

5h 32m

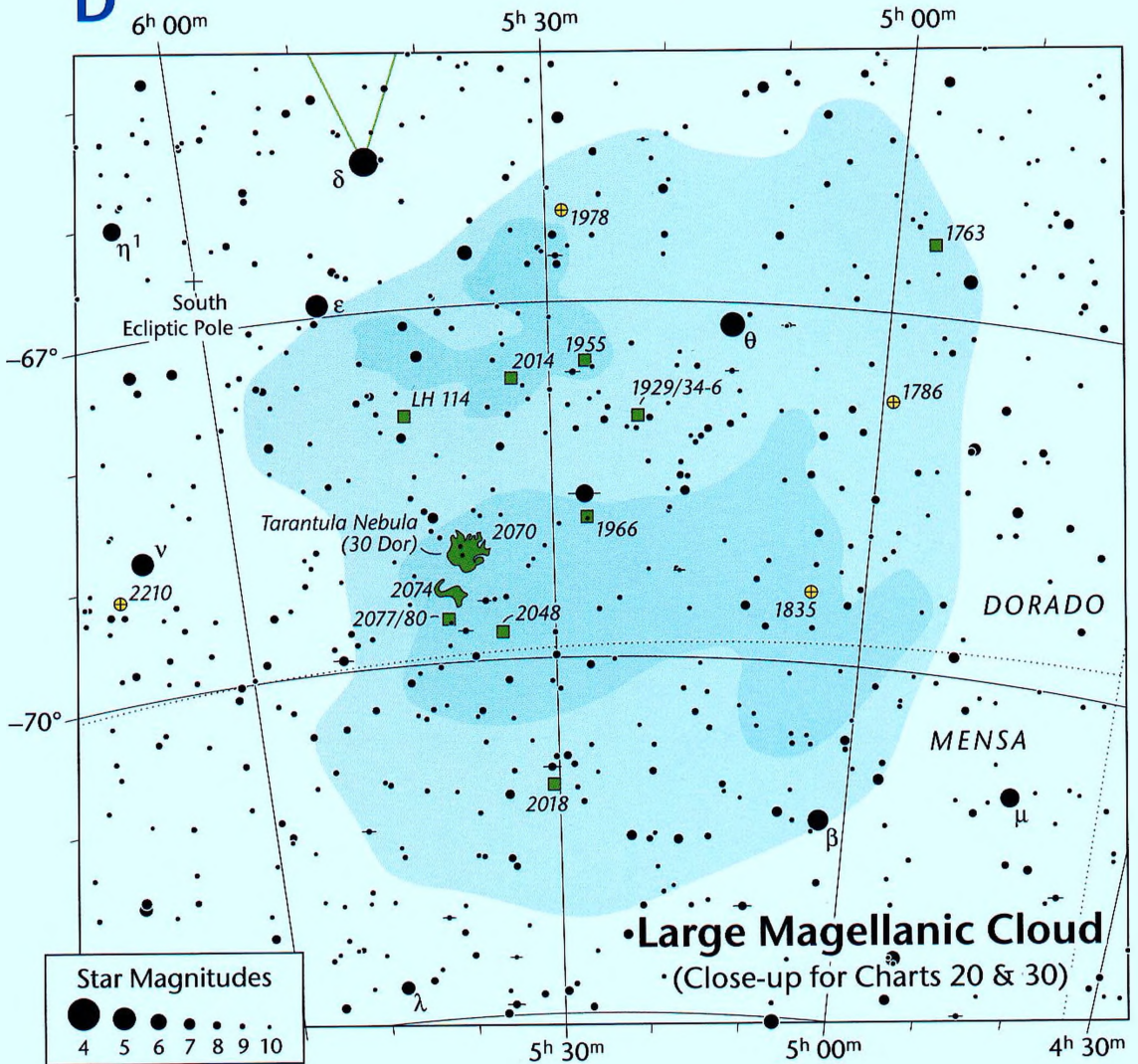


Orion's Sword
(Close-up for Charts 14 & 16)





D



continued from Chart A

yellow open-cluster symbol for clarity.

Chart B includes the easternmost bright star of Orion's Belt, Alnitak (ζ Orionis), and the softly glowing nebulosity IC 434 that makes the dark Horse-head Nebula visible in silhouette. A few degrees to the southwest is the incomparable region of Orion's Sword, containing M42, the Orion Nebula.

Visual comet hunters traditionally

avoid the Virgo Galaxy Cluster, shown in Chart C, where many galaxies masquerade as comet suspects. With the help of this chart, however, the brightest of these galaxies can be identified.

Chart D, the Large Magellanic Cloud, shows only a handful of the deep-sky objects that can be seen in small telescopes within this satellite galaxy of our own Milky Way.

General Index

For stars with common names and nonstellar objects, this listing gives the number (1–80) of a main chart or the letter (A–D) of a close-up chart on which they can be found. Objects are grouped by type: stars, galaxies (and groups), open star clusters, globular clusters, bright nebulae (including supernova remnants), dark nebulae, planetary

nebulae, and other. A constellation index appears on page xii.

Bold type is used to indicate a chart that shows the object well (that is, not too near an edge). In the rare cases when an object is plotted but not labeled on a given chart (due to being near an edge or in a crowded field), the label can be found on another chart of the same region.

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Objects in the Caldwell Catalog

Patrick Moore, Britain's renowned popularizer of astronomy, compiled the Caldwell Catalog of 109 deep-sky objects in 1995. Some are just as spectacular as the best Messier objects; others are astrophysically intriguing.

The Go To mounts of many telescopes allow objects to be located using their

C (Caldwell) numbers alone. While C numbers are not used in this atlas, these objects can be found on the charts by means of their corresponding NGC, IC, or other designation listed below.

Bold type is used to indicate any chart that shows the object well (that is, not too near an edge).

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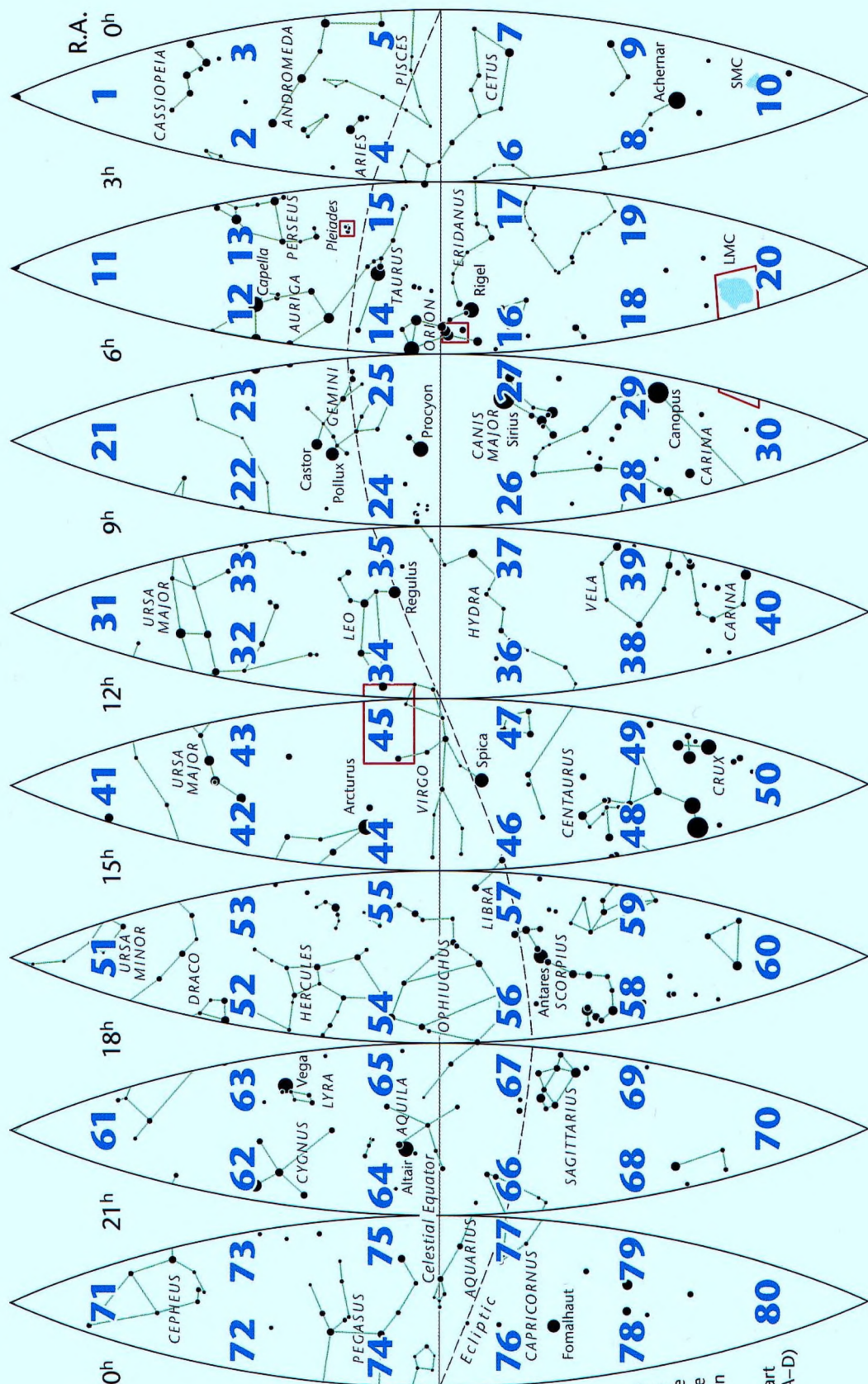
Many of the best deep-sky showpieces were first tabulated by French comet hunter Charles Messier (1730–1817) or his collaborator, Pierre Méchain (1744–1805). In this atlas the Messier (M) number takes precedence over any other designa-

tion. Listed below, in parentheses, is the corresponding NGC or IC designation for most of these objects.

Bold type is used to indicate any chart that shows the object well (not too near an edge).

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Chart Key

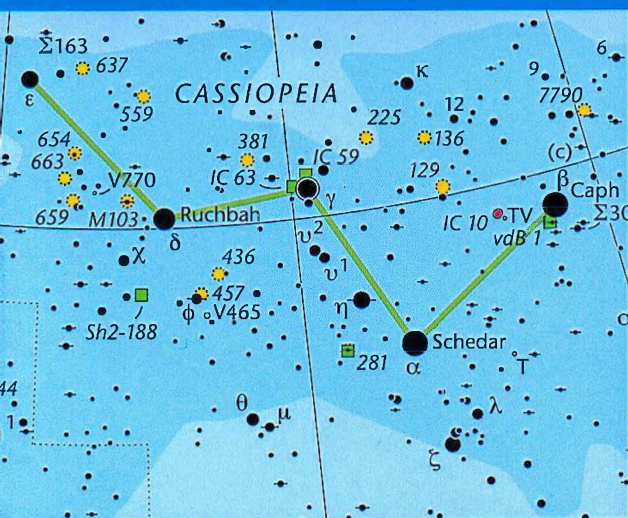


Blue numbers refer to chart numbers in the atlas. Locations are rough, since there is a sizable overlap between charts.

Close-up chart (see Charts A-D)

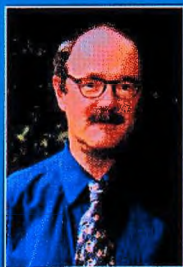
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Roger Sinnott is a senior editor of *Sky & Telescope* magazine. He coauthored the two-volume *Sky Catalogue 2000.0*. In 1997, he collaborated with Michael Perryman of the European Space Agency on the *Millennium Star Atlas*, the most detailed all-sky atlas ever printed. Minor planet 3706 Sinnott is named in Roger's honor.

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